THE IRON AGE

New York, October 14, 1915

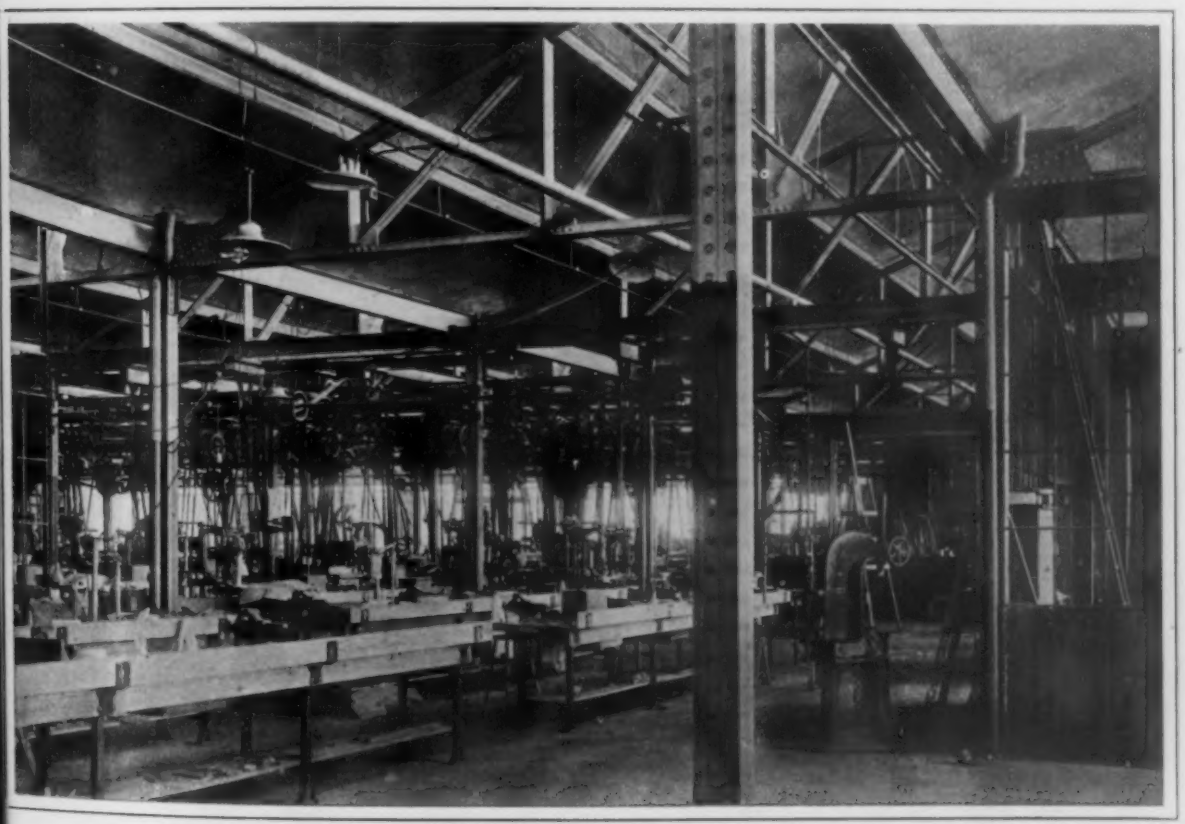
ESTABLISHED 1855 VOL. 96 : No. 16

A Jobbing Machine Shop Cost System

How Records Are Made for Material and Labor—Grinding and Engine Rooms Inclosed with Wire Glass Partitions

To cover the particular problems of the jobbing machine shop, especially of that required to make jigs, dies and other small work, the Columbus Die, Tool & Machine Company, Columbus, Ohio, has recently built a new plant. Special care was taken to insure sufficient natural light, as much of the work done is of what might be called a delicate nature.

The building itself is one story high, 170 x 200 ft., of brick and steel construction. The sides of



The Sawtooth Roof Construction and the Glass-Inclosed Grinding and Polishing Room at the Right

he building, as well as the rear end, are practically olid glass, as the windows extend from 3 ft. above he floor line to the eaves, thus insuring sufficient ight at all times during the day. This is further ugmented by light through a sawtooth roof.

On the east side of the building, about midway, s located the grinding and polishing room, meas- ring 20 x 40 ft. A feature of this room is that it s entirely inclosed by wired glass sash, which was ade by W. Bailey & Sons, Springfield, Ohio. By aving this room arranged so that it can be closed ightly when grinding or buffing, dust is kept out of the shop proper, while the inside glass sash cuts off very little light from the main shop.

The stock room is a railed inclosure, adjoining the polishing room on the west side, in plain view of the factory clerk's inclosure, which is located at the office entrance of the shop.

The offices occupy a 25 x 70-ft. space at the front end of the building and are separated from the shop by reinforced concrete walls. A second-story room directly above the offices, and of the same size, was provided for the engineering department.

In the northwest corner of the building is located the power plant, which is also screened with wire glass. A 50-hp. Reeves gas engine furnishes power for the shop, while a 25-hp. unit is used to drive a generator for furnishing electric current for lighting and power purposes. In addition a 150-hp. steam engine is provided for use exclusively in the winter for both light and power. In the winter the shop is heated by the exhaust steam from the en-

THE COLUMBUS DIE, TOOL AND MACHINE CO.
DAILY TIME CARD

CLOCK NO. 77 NAME John Jones DATE 7/8

ORDER No.	HOURS	MATERIAL	MACHINE No.	LABOR RATE	WAGES
11339	4		78	30	1 20
11410	2		75		60
1860	1½				45
3804	1½				45
11412	1				30
	10				3 00

APPROVED C.W.B. FOREMAN

The Daily Time Card Kept by Each Machine Operator

gine, also using steam drawn from the boiler direct, when the weather is cold enough to make this necessary.

The pattern shop is located at the front of the building between the office and the west wall. To obviate transmitting power such a long distance by shafting, an overhead electric motor drives the machines in this department.

In locating the different machines, the drilling machines were put near the front of the building, where the work enters, as the drilling operation is generally the first on different jobs. Small lathes and shaping machines are next to the drilling machine department. At the rear of the shop the heavier tools are placed, as in a few cases heavy work is admitted at the rear entrance and travels toward the front. As was stated, the polishing room is next to the shipping department, as this is often the last operation performed.

When an order is received, all papers, blueprints, etc., are turned over to the order clerk in the main office, who gives it the proper number and makes out an order in triplicate for use in the engineering department, factory office and inspection department. The blueprints, if furnished by the

MATERIAL For Drill Jig Tool No. 11339
Pattern Order 8122 Sheet 1 of 1 Date Entered 7/7/15

CASTING

No. Reqd.	Our Pat. No.	Their Pat. No.	Metal	Weight	TOTAL COST
1	1151	6270	C.I.	160#	
1	1152	"	C.I.	200#	

TOOL STEEL

No. of Pieces	SIZE	GRADE	Weight	Fig. No.	TOTAL COST
2	2⅛ x 3	#11	16#	1	
4	5/8 x 1	Bonnet	12#	2	

OPEN HEARTH MACHINE STEEL

No. of Pieces	SIZE	Weight	Fig. No.	TOTAL COST
1	1 9/16 x 12	5#	3	

PATTERNS: FURNISHED / TO BE MADE — CASTINGS: FURNISHED / TO BE MADE

DRILL ROD

No. of Pieces	SIZE	Weight	Fig. No.	TOTAL COST
6	1/16 x 1½	¼ oz.		

COLD ROLLED STEEL

No. of Pieces	SIZE	Weight	Fig. No.	TOTAL COST
1	3/16" x 6"	1#	4	
1	5/8 x 7	½#	5	
1				
1	5/8 x 2¼ x 39	17#	11	
1	5/8 x 4	6 oz.	12	

COLD ROLLED STEEL

No. of Pieces	SIZE	Weight	Fig. No.	TOTAL COST

Remarks Tool No.

SCREWS

No.	CLASS	SIZE	COST EACH	TOTAL COST
6	Hex	¼ x 1½		
5	Fill	½ x 3		

NUTS

No.	CLASS	SIZE	COST EACH	TOTAL COST
3	Hex	¼		

HIGH SPEED STEEL

No. of Pieces	SIZE	Wgt.	Grade	Fig. No.	TOTAL COST
1	⅜ x 3	1#	None		

FORGINGS

No.	WEIGHT	GRADE	Fig. No.	TOTAL COST
1	44#	T.S.	44	

SPRINGS

No.	SIZE	COST EACH	TOTAL COST
	To suit work		

TAPER PINS

No.	SIZE	COST EACH	TOTAL COST
1	# 4		

MISCELLANEOUS MATERIAL

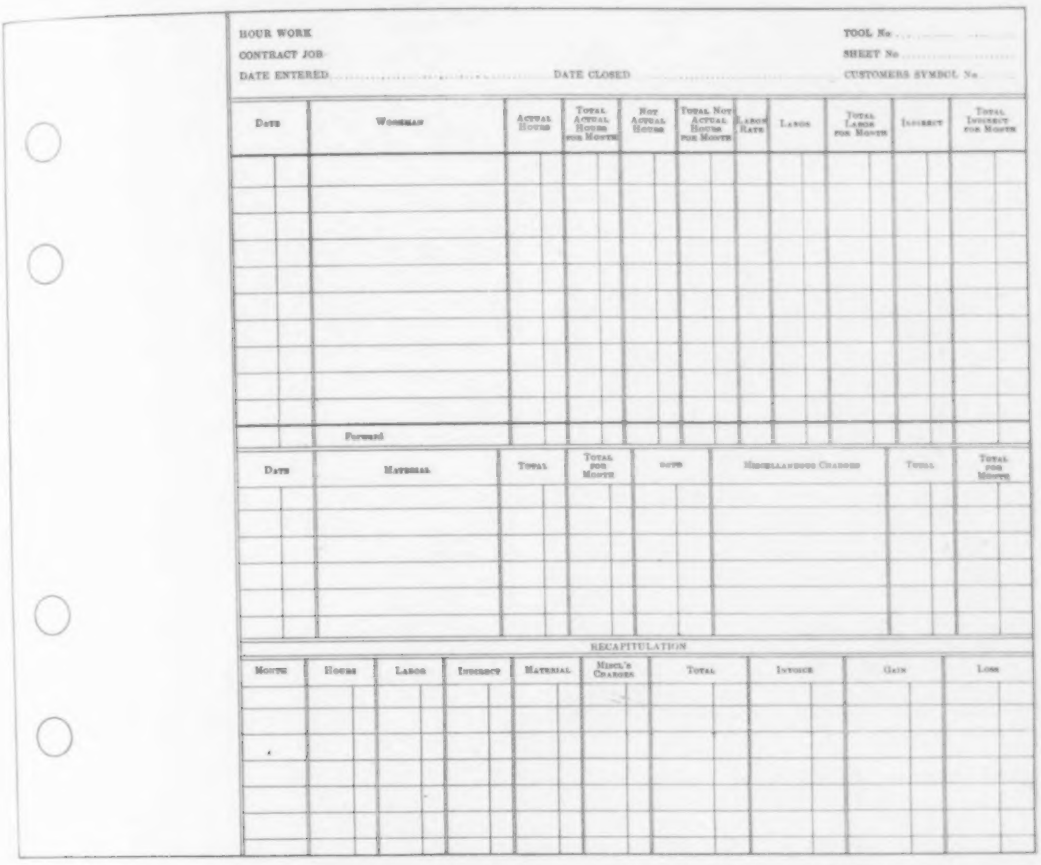
ARTICLE	TOTAL COST

MISCELLANEOUS MATERIAL

ARTICLE	TOTAL COST

The Bill of Material Which Is Made Out by the Office as Soon as an Order Is Received

customer, are turned over to the engineering department, which makes out a list of the material and patterns required. The material sheet, blueprint and other data are then turned over to the factory office, where records of material issued and



HOUR WORK — TOOL No.
CONTRACT JOB — SHEET No.
DATE ENTERED — DATE CLOSED — CUSTOMERS SYMBOL No.

Date	Workman	Actual Hours	Total Actual Hours for Month	Not Actual Hours	Total Not Actual Hours for Month	Labor Rate	Labor	Total Labor for Month	Indirect	Total Indirect for Month
	Forward									

Date	Material	Total	Total for Month	Date	Miscellaneous Charges	Total	Total for Month

RECAPITULATION

Month	Hours	Labor	Indirect	Material	Misc'l's Charges	Total	Invoice	Gain	Loss

One of the Sheets Filled Out for Each Job to Give a Record of the Labor and Material Costs

other information are kept. The cost columns are not filled out until the material sheet reaches the accounting department, which is sent in when the job is completed.

As most work is done on a time basis, it is absolutely necessary to keep a close record of the time put in on each job. When a workman is assigned to a job, he starts his time at the factory office, taking the blueprint and stock to his machine. As soon as his particular operation is completed, if the piece is not too heavy, it is returned to the factory office, where it and others are kept between operations, and his time entered on the card shown.

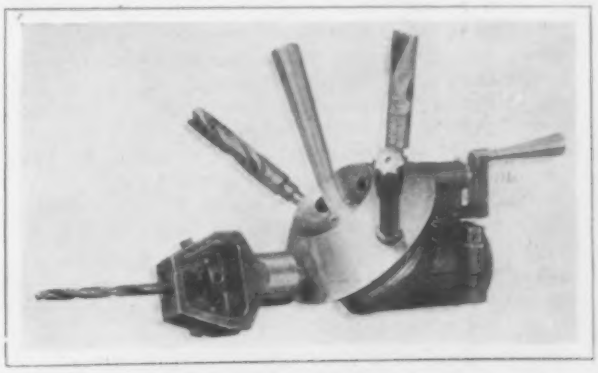
A separate time entry is made on these cards for different work, the cards being turned in each day, so that an accurate record can be kept in the office of the total number of hours each man worked, as well as the time spent on each individual job. This is essential for the accounting department not only on time work but on special piece work as well.

Although cost estimates are given on most orders handled before work is commenced, it is a frequent request of customers that they be furnished with a daily report of the time-cost on their jobs, and in this way they are not only able to keep up with the progress of the work, but also to figure out fairly well what the ultimate cost will be.

The training of young mechanics is to be the subject of an address to be made by W. B. Humper, director of the Pittsburgh High School, at a meeting in Buffalo, N. Y., Oct. 21, of the American Society of Mechanical Engineers.

Detachable Turret Head for Lathes

The Newman Mfg. Company, 717 Sycamore Street, Cincinnati, Ohio, is putting on the market a turret attachment for the tailstock of engine lathes up to 24-in. swing. By this device an ordinary engine lathe can readily be converted into a turret lathe, suitable for many manufacturing operations, and thus greatly reducing the cost of ordinary methods. As will be seen from the illustration, the device consists of a circular turret containing four holes for mounting tools and the necessary arrangements for attaching it to the tailstock spindle of the lathe. The turret proper, which is 7 in. in diameter, is mounted at an angle of 45 deg., which brings the lowest turret hole in exact line with the tailstock spindle. The indexing device consists of a hand-operated plunger provided with a taper end which engages holes in the extreme periphery of the turret and is relied upon to insure accuracy in indexing. The handle for operating this plunger is located in a convenient position directly above the tailstock.



A Detachable Turret Head Holding Four Tools Designed for Mounting on the Tailstock of an Engine Lathe

The attachment is mounted on the tail spindle and securely held in place by a split bearing and clamping bolt, the tool in use lining up with the spindle.

Electric Steel Furnace of New Design

The Wile Arc Type Uses Two Top and One Bottom Electrode on a 3-Phase Current—Results in Refining Steel

Another type of arc furnace has been added to the list of electric arc furnaces producing steel in the United States. Besides the Heroult, the Snyder, the Stassano and Girod furnaces and the recent installation and operation of the Grönwall in Detroit, the Wile furnace has recently become a competitor in this field. While primarily introduced as an efficient means of pre-melting ferro-alloys and non-ferrous alloys, several installations have recently been made in steel foundries and other plants in this country, a list of which was given in THE IRON AGE, Aug. 29, 1915.

The Wile Electric Furnace As It Appears When in Operation

Commenting on the electric steel industry in general, R. S. Wile, president of the Wile Electric Furnace Company of Pittsburgh, Pa., said to a representative of THE IRON AGE:

A great deal has been said for and against the electric furnace for making steel of various qualities and it has been largely contended heretofore that only tool or special steels were feasibly made by this method of refining because of the cost of operation, which means power, electrodes, linings, etc. Selling at fancy prices, these steels could easily absorb any additional costs even as high as 1c per lb. That it was an advantage to make these special steels in the electric furnace nobody denied because of the low phosphorus and sulphur contents in the finished product as compared to the raw material used as a basis.

Since, however, some companies have deemed it profitable to undertake to make sound castings of low carbon, low manganese content, combined with low sulphur and phosphorus, the electric furnace has taken on a new aspect and one might add a new lease on life. As the field has broadened the number of furnaces on the market has increased so that it now includes single, 2- and 3-phase, and induction furnaces of various styles and combinations of connections. Claims of certain advantages are made for all of them.

In response to a request for a description of the furnace and its achievements in the melting and refining of steel, Mr. Wile furnished the following:

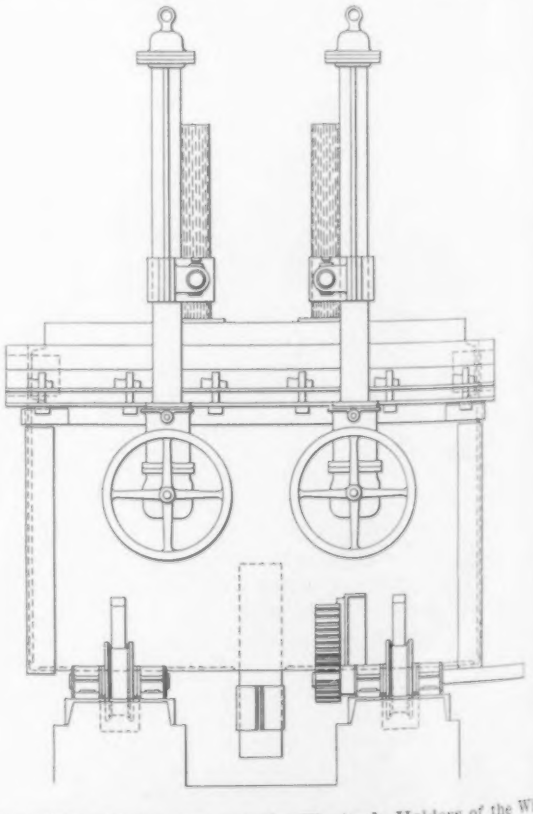
The Wile furnace is of the 3-phase type, more particularly because the supply systems of the country are 3-phase and furnaces using other than this entail expensive transformers and greater transforming losses in stepping from 3- to 2- or single-phase.

The only prominent arc furnaces using this current in the United States, apart from the Wile, are the Stassano and the Heroult. The Nathusius uses this current, but in Europe only. The Stassano is an arc furnace with three horizontal electrodes but it is limited to capacities of 5 tons; the Heroult is the best known and has three electrodes inserted through the roof with no bottom electrode; the Nathusius has three top and three bottom electrodes while the Wile furnace has two top and one bottom electrodes.

This latter connection has a number of advantages. In all steel refining one of the most essential things is to free the steel of gases in order to make sound castings or ingots as the case may be. In the furnace with the three top electrodes, or those entirely above the charge, it is necessary to superheat the steel or cause it to boil to free it of gases. This temperature is much higher than the pouring temperature, hence it is necessary to cool the steel before pouring. This causes undue wear upon the furnace refractories and a low load factor for the furnace. This does not hold true in the 3-phase furnace with the bottom electrodes as the circulation of the steel is plainly visible and the superheating is unnecessary.

While some of these points seem of minor importance they form big factors in the aggregate. Again it is often imperative that the furnace be started on cold stock. In loading the furnace the heavier pieces are placed on the bottom and the lighter and smaller pieces are placed on top so that the top presents a fairly smooth appearance; it does not have any ragged projections to cause unnecessary fluctuation in the line. This consumes a little more time but it saves it in the end by keeping the breaks from flying out so often. This also helps the load factor.

In starting a furnace with three top and no bottom electrodes it is necessary to burn a hole through the pile of steel clear to the bottom in order to form pools of metal to do away with violent fluctuations. These occur in the furnace with the two top and one bottom



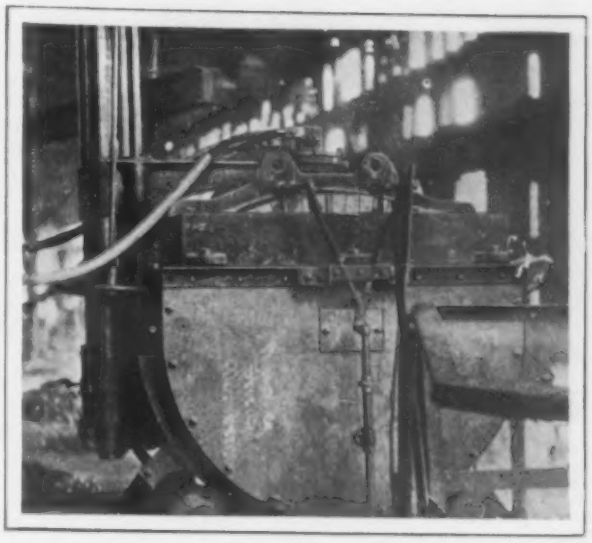
The Tilting Mechanism and the Electrode Holders of the Wile Electric Furnace Shown in Section

electrodes, also, but to a lesser extent, due to the absence of one top electrode thus lessening the number, but more particularly because of the simultaneous melting of the steel on the bottom at the same time it is melting at the top and in that manner forming the pool quicker and with fewer surges. In the Wile furnace the bottom electrode is made of graphite but it stops short of the metal bath, the actual furnace bottom being made of a conducting bottom of magnesite and tar, which causes no more trouble in operating than does the bottom in any furnace. It is necessary in any steel furnace to patch the bottom occasionally. When the furnace is started absolutely cold, it is with the two top electrodes until the bottom becomes conducting. This happens only when the furnace is stone cold and is a condition which does not last long nor occur often.

It is preferable of course to use molten materials. A very large number of furnaces are thus operated but it is often expedient to use cold stock where there is no open-hearth plant to furnish steel in the molten state. It is not prohibitive to melt it cold but the demand on the source of power is greater and the installation more elaborate, due to the greater amount of current needed if the same tonnage is to be required that is obtained from the furnace refining molten stock.

It is not maintained that the current consumption in the Wile furnace is any less than in the furnace with three top or horizontal electrodes as this factor depends largely upon furnace design and insulation; but it does enable the furnace to be worked with fewer abnormal variations of the load and it can be more easily regulated by hand where there are only two electrodes to manipulate, though automatic regulators are supplied to this furnace where desired, and they usually are. It uses less current than a single- or 2-phase furnace in instances where these take the supply from a 3-phase system when the heat insulation of the furnace is not the sole factor but the losses in transforming enter as well.

In this connection it may be added that, while special transformers to change the number of phases are in themselves expensive, they change the number of phases with a resulting loss of power and in balancing some is also bound to occur. It has been maintained by some that this is somewhat offset in the single-phase furnace by the lesser amount of radiation and electrode loss caused by the one electrode through the roof. This has not proved compatible with the facts, as the multiple electrode furnace uses smaller electrodes and while the number is greater than one the conducting area must be the same, as the electrodes are designed to carry the required number of amperes per square inch; therefore, in well designed furnaces the radiation from this source should the same. The ultimate analysis in any event is the cost per ton.

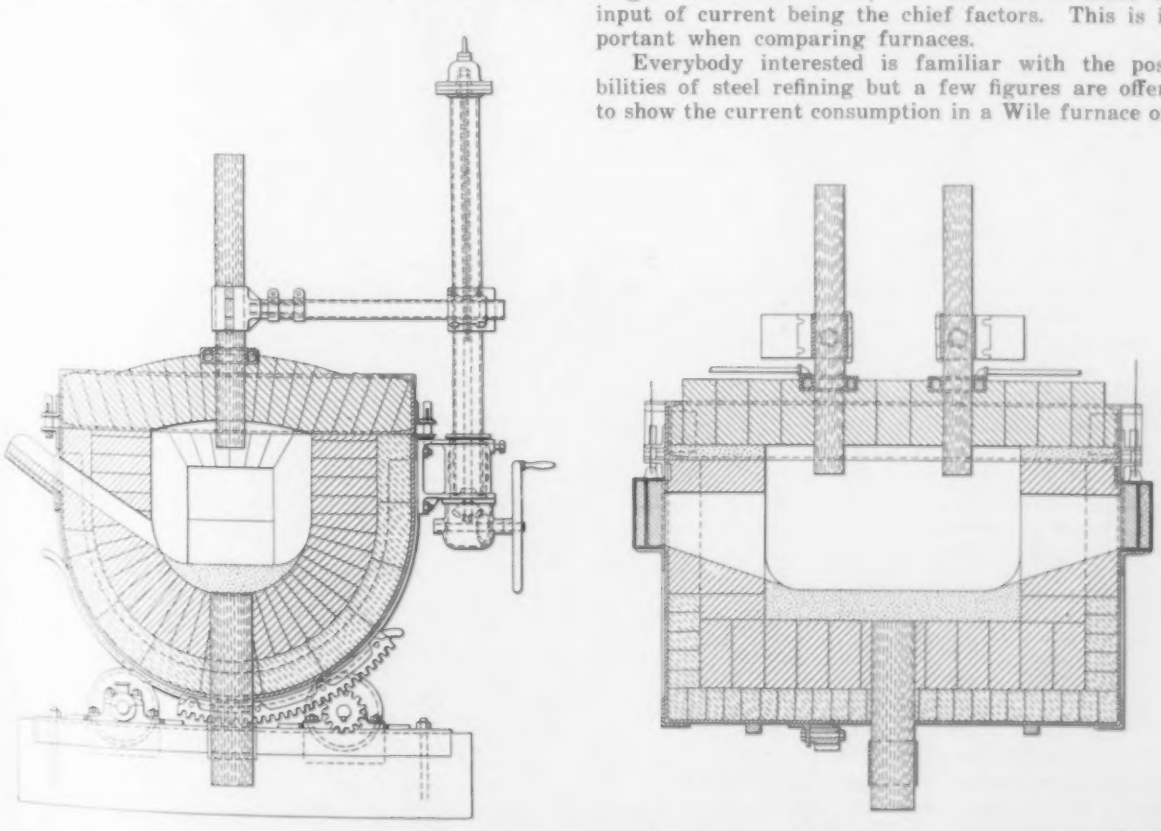


A Side view of the Wile Electric Furnace Under Operating Conditions

The violent fluctuations of the load spoken of above occur only when melting cold stock. All furnaces are uniformly quiet when running on molten material and the number of furnaces refining molten steel is probably in excess of those starting with cold stock.

The time consumed in refining the molten steel depends upon the impurities to be removed, though this is also true when cold material is used, but in this latter case the practices in different furnaces vary and design also enters here. Some furnaces require a longer time than others, the variation of sizes and input of current being the chief factors. This is important when comparing furnaces.

Everybody interested is familiar with the possibilities of steel refining but a few figures are offered to show the current consumption in a Wile furnace of 2



Sectional Representations of the Wile Electric Furnace Showing the Location of the Three Electrodes and the Tilting Mechanism

tons capacity, starting with cold scrap having the following fairly uniform analysis:

	Cold Scrap, Per Cent	Finished Product, Per Cent
Sulphur	0.061	0.018
Phosphorus	0.04	0.024
Silicon	0.09	0.110
Carbon	0.28	0.12
Manganese	0.31	0.31

Time of melting and refining.....4 hr. 20 min.
Kilowatt hours per ton..... 868
Electrode consumption per ton..... $0.50

These figures are given not to prove superior practice but as an idea of one operation. They will vary for different requirements and will give a fair average in this one installation.

The Wile furnace is also being used in melting nickel-iron for casting grid resistances as well as in melting cobalt for making steelite. Its application in the smelting of tin from Bolivian concentrates, mentioned in THE IRON AGE, Aug. 26, 1915, is reported as satisfactory with prospects of expansion.

MILLS PURCHASING POWER

Advantages Which, Recent Papers Claim, Are Not Appreciated by Steel Industry

That steel mills could more generally consider purchasing power from the central station was the burden of two papers read before the recent meeting of the Association of Iron and Steel Electrical Engineers in Detroit. One of these was presented by Clark S. Lankton, electrical engineer, Carnegie Steel Company, Painter mills, Pittsburgh, and the other a joint paper by Brent Wiley and Wilfred Sykes of the Westinghouse Electric & Mfg. Company, East Pittsburgh.

Mr. Lankton presented some of the arguments for central station manufacture of power against the manufacture of power by the comparatively small concern, involving the size of generating units, the power factor, the economy of the small unit as compared with that of the large, and emphasized that usually a given industrial management has equipped a power house not for the return on the investment but because of the necessity. He does not advise the wholesale adoption of purchased power, but feels that "it often happens that an extension to the plant is to be made. In such a case a start at purchased power might be attempted." Eliminating the few cases of exceedingly large steel mills, where the power plant itself is of a size commensurate with that of the public service station, he feels that "the possibilities of purchased power versus power generated within the confines of the steel plant are not fully realized by all."

As showing the development in central station practice and economies, he referred to statistics which show that for the five-year period of 1907 to 1912

the total kw. capacity in generative apparatus has increased 70 per cent. The installation of alternating current apparatus has increased over 100 per cent. The capacity of individual machines has been raised 90 per cent, while the number of machines in use has decreased 7 per cent. These figures plainly show that old machines of small capacity have been discarded and new and larger capacity machines installed. The output of central stations has increased 100 per cent in this same period of time, while the capitalization of central stations has only increased 52.9 per cent.

ELECTRIC POWER PURCHASED BY STEEL MILLS

In conclusion he urges that if an adequate central station power supply is available and it can be adapted to the plant conditions, the power company officials should be approached. He says that there are about twenty to twenty-five steel plants using purchased power with an estimated yearly consumption of about 175,000,000 kw.-hr. per year.

The paper by Messrs. Wiley and Sykes gives a list of twenty-four plants which use approximately 160,000,000 kw.-hr. of purchased power per year, which figure, it is stated, is approximately 12 per cent of the total electric power used in the steel industry. They believe that the reason why steel companies are developing slowly as customers of central stations is the indefiniteness of power requirements for rolling, which makes the power companies' proposals indefinite, and because the steel companies seem somewhat skeptical regarding the question of continuity of service. They intimate, however, that electrical manufacturing companies are in possession of so much data that they are in a position to help in making the necessary analysis in the case that the motor drive is to be installed in place of the steam engine drive. For example they say:

The steel companies often express a strong desire to have either the central station company of the motor manufacturer guarantee that their rolling will not cost more than a certain amount for power. While the motor manufacturer is willing to outline the amount of power required and the load conditions that will exist according to the rolling conditions, he cannot assume any such responsibility as mentioned above, due to the fact that he does not have jurisdiction over the operation of the plant.

NUMBER OF MOTOR-DRIVEN ROLLING MILLS

They place the total number of motor-driven rolling mills at 200 and the total capacity of motors driving main rolls at 275,000 hp., not including units below 300 hp.

From statistics obtained from several large steel companies, the authors note that the motor capacity installed per ton of pig iron per year capacity is 0.0064 hp. and that the motor capacity installed per ton of steel per year capacity is 0.0136 hp. As instancing the economies effected through motor operations, they mention how in the older method of unloading ore, involving the hand filling of the bucket and the conveying of the bucket to the stock pile by means of a steam-operated rope haulage system, the cost per ton in handling from boat to yard was approximately 15 cents. The motor-operated unloaders of to-day, with much greater capacity and reduction in time, do the work for approximately 2 cents per ton.

Liquid Fuel for Foundry Cupolas

Bradley Stoughton, in presenting his paper on "Oil-Fired Cupolas" before the American Foundrymen's Convention at Atlantic City, N. J., Sept. 29, 1915, discussed the absorption of sulphur and the kind of oil to be used in his patented process. He said:

In a comparative test made for us, Dr. Richard Moldenke found that iron which, when melted with coke, contained 0.050 per cent of sulphur, when melted in the oil cupola contained 0.045 per cent of sulphur. Another test showed that iron increased from 0.032 per cent to 0.045 per cent (an increase of 0.013 per cent) in an oil-cupola melting 50 per cent of its own scrap. In other words, one-half of the iron had been twice through the cupola to make this increase of 0.013 per cent in the total.

Crude oil, because it is cheaper and of higher heating value than fuel oil, is preferred for melting work. It is more viscous, however, and requires to be heated by some simple means, such as steam, gas or electricity. If this is inconvenient, then fuel oil may be used, but the cost of warming the crude oil is much more than compensated for by its lower price. Furthermore, the sources of supply of crude oil are more numerous than those of fuel oil. It is not of great importance that low-sulphur oil be used, because practically all the sulphur in the oil is oxidized by the blast and does not enter the iron, but passes out of the cupola with the gases.

These interesting facts are supplementary to the practical results offered in an article in THE IRON AGE of May 13, 1915.

Heat Losses of Hot-Blast Mains

The loss of heat from blast-furnace hot-blast mains has recently been investigated by R. J. Wysor, chief chemist, Bethlehem Steel Company, South Bethlehem, Pa. In 1912 and 1913 he made some tests of the loss in temperature of hot blast mains from the hot stoves to the bustle pipe and found the average loss to be 26.86 B.t.u. per minute per square foot of surface. In this case 33,500 cu. ft. (at 62 deg. Fahr. and 30 in. barometer) of air were blown per minute. He found that the average temperature at stove No. 5 of blast furnace G was 1486 deg. Fahr., while the average temperature at the bustle pipe 218 ft. along the pipe from the first temperature measurement, 1382 deg. Fahr. The total loss in heat figured at 70,000 B.t.u. per minute, and as there were 2606 sq. ft. of total radiating surface, the unit loss of heat is, as stated, 26.86 B.t.u.

The details of the tests have been contributed by Mr. Wysor to the American Institute of Mining Engineers, to be submitted at the New York meeting of the Institute in February. In the course of his investigation he determined the thermal loss due to cooling water from each hot blast valve and mentions a new type of gate valve being installed by Herman A. Brassert, superintendent of blast furnaces, Illinois Steel Company, South Chicago, to secure a small water cooled surface in contact with the blast.

In experiments at Bethlehem with a special insulating brick for reducing heat losses, although an appreciable lower temperature on the outside resulted, the difference was not so great as had been calculated. Discussing the subject, he says:

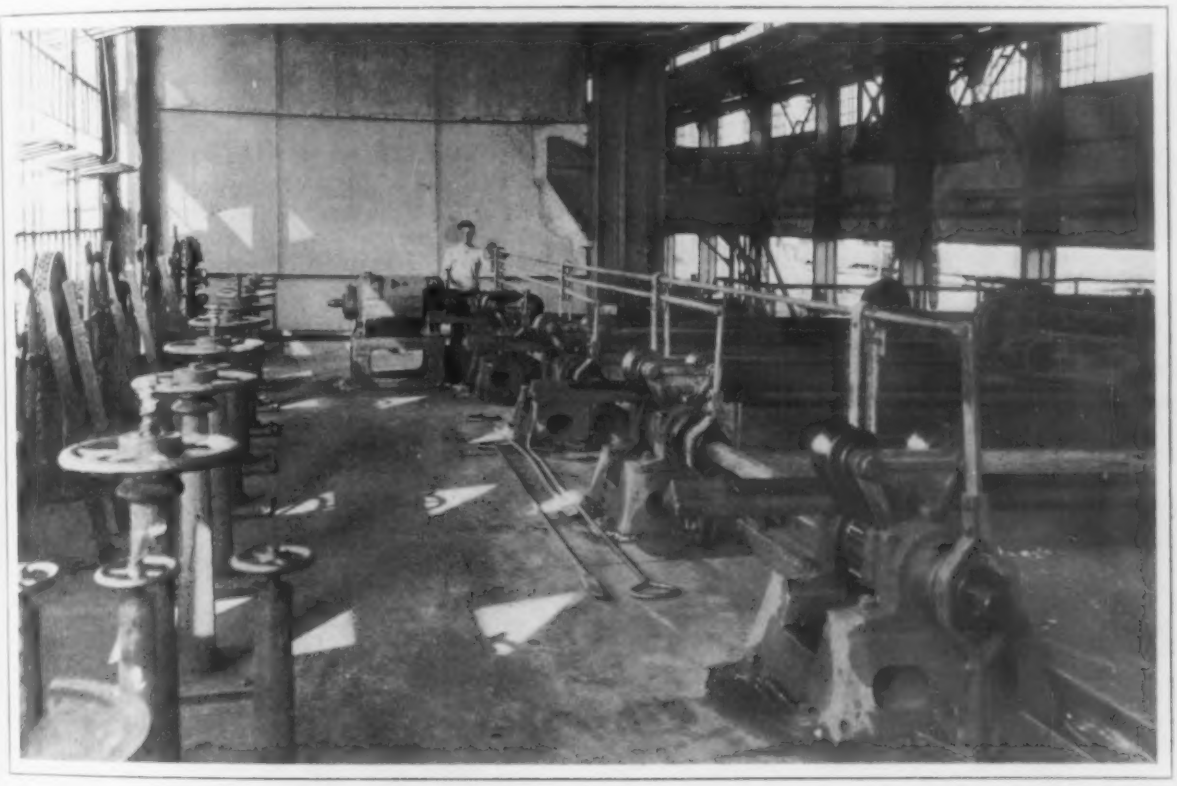
> Estimates have been prepared for external insulating with 1½-in. pipe-covering blocks, a 1-in. air space being provided. Besides the possible objections to appearance, first cost and maintenance, the question of possible overheating the shell must be considered. In the construction of a new blast main, the logical plan would apparently be to design it of sufficient diameter to permit lining with 9 in. of fire brick and a backing of several inches of insulating material.

The present tendency is toward higher blast temperatures on furnaces carrying large percentages of Mesaba ores in their mixtures; and high temperatures have always been desirable in smelting hard, coarse ores, such as the magnetites so generally used in the East. In the manufacture of spiegel and ferromanganese, the maintenance of high blast temperatures is of particular importance.

By means of one of the methods of insulation suggested in this paper, other operating conditions being normal, we would expect higher available blast temperatures with resulting fuel economy, or a smaller quantity of fuel gas necessary for heating the stoves.

Electric Manipulation of Pit Furnace Covers

At the steel works of the Central Steel Company, Massillon, Ohio, the covers of the pit furnaces are operated electrically, as was mentioned briefly in an article descriptive of the works of the company in THE IRON AGE of Jan. 7, 1915. In fact one of the striking features of the plant is the general use of electricity, neither steam nor hydraulic power being employed. From the accompanying reproduction of a photograph some idea may be gained of the method of operating the covers. It will be noted that a single electric motor suffices for the four pit furnaces provided, the electric motor driving a shaft with four pinions. Each pinion meshes with a rack attached to a corresponding cover and by means of the long levers shown, any one pinion may be thrown into action by a clutch. The operator may control the motor with one hand, and the lever for any cover may be moved with the other. Incidentally toward the right of the picture may be seen the bottom part of the crane for handling the ingots. Each pit furnace has four holes 6 x 8 ft.



Racks to Pit Furnace Covers, Plant of Central Steel Company, Massillon, Ohio, Actuated by Electric Motor at Rear

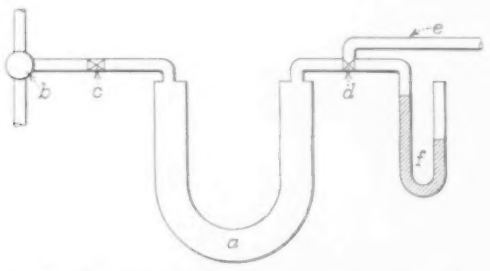
An investigation of fusible tin boiler plugs by the Bureau of Standards is the subject of Technologic Paper No. 53, which may be obtained on application to the Bureau of Standards, Washington, D. C. An account of the causes of failure and deterioration of boiler plugs in service, as studied by the Bureau was, it will be recalled, given at some length in THE IRON AGE of June 24, 1915.

U-Tube Carbon Dioxide Indicator

Simple Form Employing Familiar Principle for Use by Fireman—More Elaborate Type to Give a Continuous Record

BY E. A. CUNNINGHAM*

The economical combustion of coal should be the aim of all power house managers. Before this can be accomplished, it is necessary to know something of the conditions under which the coal is burned. It is perhaps not too much to say that the most important information can be gained from the nature of the waste gases passing up the stack. If the carbon dioxide percentage and the temperature of these waste gases is known, the actual waste of coal can be determined in percentage by the simple formula



Elementary Form of Gage for Indicating Presence of Carbon Dioxide in Flue Gases

$$\text{Percentage of coal wasted} = 0.335 \frac{(\text{Temp. of flue gases}) - (\text{Temp. of boiler room})}{\text{Carbon dioxide percentage}}$$

Although the above is only an empirical formula it is surprisingly close to the actual loss calculated by the usual methods in a heat balance, as the following table shows:

Boiler Test Number	Per Cent Loss up the Stack Calculated by Formula	Per Cent Loss up the Stack as Shown by Heat Balance	Error
1	16.50	16.70	—0.20
2	14.10	14.37	—0.27
3	18.80	19.10	—0.30
4	25.10	24.70	+0.43
5	15.40	15.80	—0.40
6	21.90	21.60	+0.30
7	15.30	15.70	—0.40

For example. If the temperature of the gases passing up the flue were 675 deg. Fahr., the temperature of the boiler room was 75 deg. Fahr., and the percentage of carbon dioxide was 5 per cent, then the waste of coal up the stack would be

$$0.335\ (675 - 75) \div 5 = 600 \div 5 \times 0.335 = 40.2 \text{ per cent}$$

so that, if 1000 tons were used during a month, then 402 tons have disappeared without having given up any heat to the boilers, and it must be borne in mind that this is not an extreme example but is happening in many installations. Such a condition of affairs must necessarily exist as long as no check is kept on the carbon dioxide content and temperature of the flue gases. If, for instance, in the example just given, we had been able to note that the percentage of carbon dioxide was low, and by decreasing the draft or thickening the fire we had increased it to 13 per cent, then assuming that the temperature remained the same, our loss would only be

$$600 \div 13 \times 0.335 = 15.44 \text{ per cent or } 154.4 \text{ tons}$$

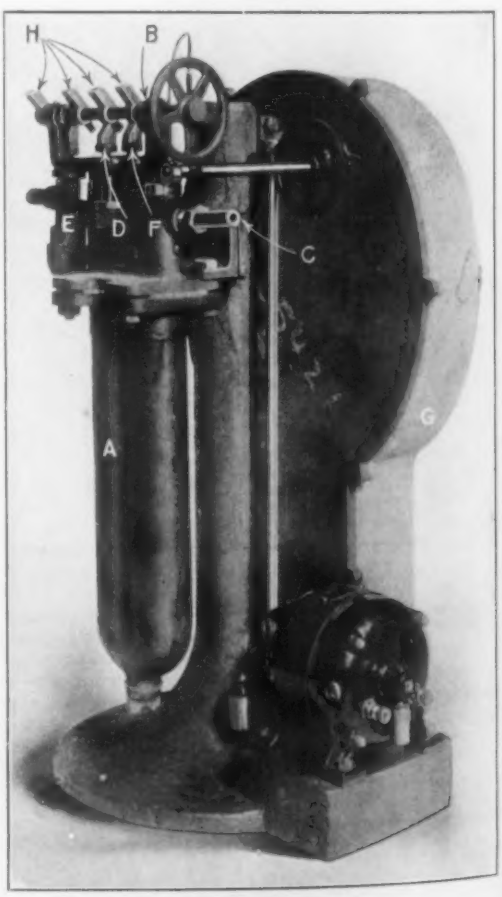
so that the saving by this knowledge would be

$$402 - 154.4 = 247.6 \text{ tons.}$$

Such knowledge could be obtained by continually analyzing the flue gases, but of course this is impracticable, so we have to turn to some form of instrument that will record approximately the percentage of carbon dioxide in the flue gases.

It appeared to me that an instrument designed for this purpose should be very robust, that is to say, made completely of metal, and also be of the simplest construction so that it could be easily understood and repaired by a mechanic. It also seemed desirable to have two forms of instrument; one to record the percentage on a chart, and another of cheaper construction, which would only indicate the percentage on a gage. To accomplish this, an air-tight vessel is charged with a solid block of caustic potash and the flue gases passed through at high speed. The flue connection is then shut off, and the vessel connected to a mercury gage. A vacuum is then formed in this vessel which the mercury gage permits to be read. This describes the apparatus in its elementary form, as an indicating gage, which is shown in the accompanying drawing.

The U-tube *a*, both legs of which are filled with caustic potash, has connected to one leg the aspirator pump *b* from which it can be shut off by the cock *c*. To the other leg is attached a three-way cock, *d*, by which it can be alternately connected either to the pipe *e*, leading to the source of supply

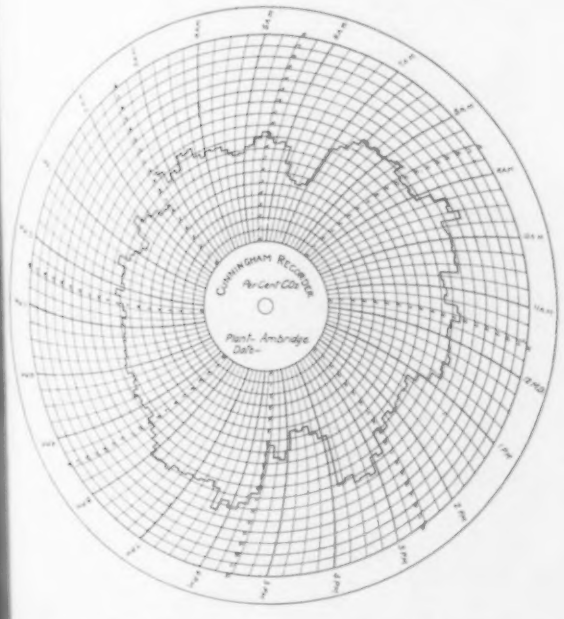


Motor-Driven Recording Instrument

*Chemist American Bridge Company, Pencoyd, Pa.

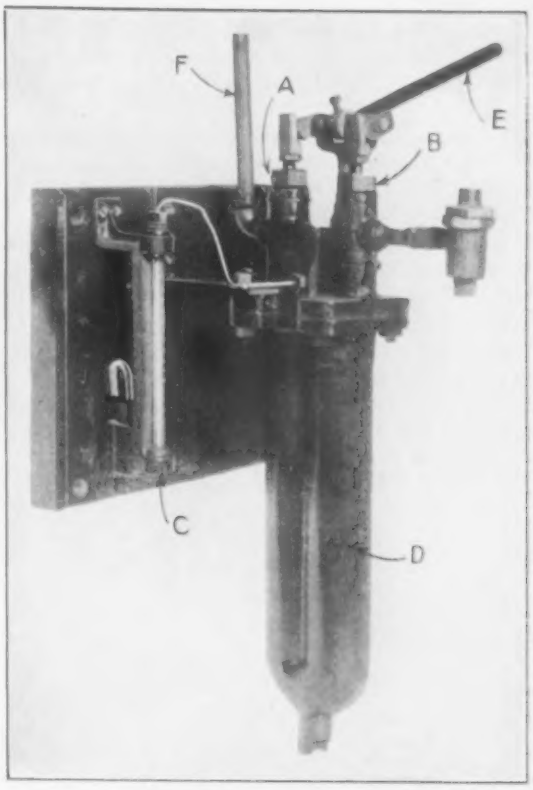
of the gas to be analyzed, or to the recording or indicating gage, in this case represented by the mercury gage *f*. If a recording vacuum gage is substituted for the mercury gage, we have the apparatus in the recording form.

In the recording type of instrument as made the cast-iron U-tube *A* in each leg of which there is placed a block of caustic potash, is bolted to a cast-iron valve body having three valves of a poppet type. One of these valves *B* allows one leg of the U-tube to be connected to the flue gases through *C*; the other valve *D* allows the second leg of the U-tube to be connected to an aspirator pump, *E*, and the third valve *F* connects the U-tube to a recording gage, *G*. All the valves are operated by cams *H* attached to a shaft which in turn is geared to a small electric motor. Two of these valves are placed on the shaft in such a position that the two valves connecting to the flue and aspirator pump are first opened. These two valves allow the gases from the flue to be swept through the U-tube, the speed being such



A Specimen Chart Obtained with One of These Instruments

that the absorption of carbon dioxide is negligible. As the cams continue in their revolution, they allow these two valves to close, thereby trapping a quantity of flue gases in the U-tube. The carbon dioxide is then absorbed, causing a vacuum to be produced, directly proportional to the percentage of the absorbed gas. That is to say, 1 per cent = 1/100 of a complete vacuum and so on, the ultimate result being that 100 per cent would produce a reading equal to the barometric height. When the absorption is complete, the third cam mentioned opens the third valve, which can be called the recording valve, connecting the U-tube with a recording vacuum gage, thereby causing the vacuum which was produced to be recorded. As this third cam continues to revolve, it allows this valve to close, holding the pen of the recorder to its position till the revolution of the cams causes the whole operation to be repeated. It will thus be seen that the pen of the recorder does not return to zero between readings, but makes a single line curve. This operation is then repeated once in every revolution of the cam shaft. The simple principle illustrated in the diagram is not departed from in the case of the recorder. A constant running motor through suitable gearing operates two valves at



Hand-Operated Indicating Instrument

regular intervals, and a special instrument is attached instead of the mercury gage to record the result of each analysis.

In the simpler form of indicating instrument there are only two valves used, namely, the inlet and outlet valves *A* and *B*, there being no third valve necessary, as the mercury gage *C* is directly connected with the U-tube *D*. These two valves are operated by a hand lever, *E*, which allows them to open and shut, thereby trapping a quantity of flue gases which come in through *F*, as before mentioned. The mercury column then begins to rise and remains stationary when the absorption is complete, the height being read on a scale placed behind the column which shows the percentage of carbon dioxide in the flue gases. By these hand instruments a fireman can immediately tell what condition his fire is in and also if he is using too much air, for it is obvious that a fireman cannot be held to account for the condition of his fire if he has no accurate method of knowing how his fire is at any instant.

On first consideration it might be thought that the absorption of carbon dioxide during the period of flow through the U-tube would be very great, but this has been proved, by extended experiments, not to be so. The following table shows the results of the chart record and an analysis made by a Hempel apparatus simultaneously. It will be seen from this that there is no absorption.

Recorder	Hempel Apparatus
9.5	9.8
9.6	9.6
9.0	8.5
9.5	9.0
10.2	9.8
10.8	10.6
10.7	10.6
10.0	10.1
9.6	9.4
9.4	9.8
10.0	9.8
Average 9.76	9.73

The above averages are practically identical and the greatest difference, ½ per cent, is perhaps due more to the difficulty of obtaining representative

samples for the two methods of analysis. Both instruments are constructed throughout of metal and are consequently not in any sense fragile or easily deranged.

The indicating instrument is, in principle, as shown in diagram but its actual appearance is shown in one of the accompanying halftones. It also has special poppet valves instead of cocks for control of the gases during sampling, analysis, etc. As its name implies, it only indicates the percentage of carbon dioxide and is worked by hand.

The operation of this instrument is very simple, it merely being necessary to start the aspirator pump and lift the valves *A* and *B* by handle *E* for a short space of time. The valves are then allowed to close and the percentage of carbon dioxide is read on the mercury gage *C*.

The instruments are being manufactured by the American Bridge Company.

Single-Purpose Chucking Turret Lathe

A single-purpose chucking turret lathe designed for machining 3 to 5-in shrapnel and high-explosive shells has been brought out by the Cleveland Crane & Engineering Company, Wickliffe, Ohio. This machine has been developed along simple lines for turning, drilling, boring and end forming operations, and is of rigid construction to withstand severe operating conditions. It is arranged for only two speeds, having friction changes in the headstock direct from the pulley on the main lineshaft. It has a simple feed mechanism, two feed changes being provided by a 3-in. belt and two-step cone pulley on fixed centers.

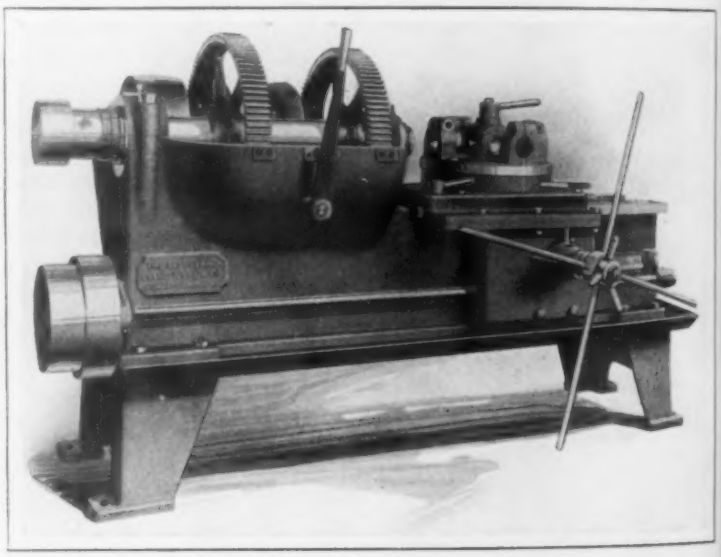
It has three different equipments of parts mounted on the bed. For turning it is furnished with a tailstock on the carriage upon which is mounted a cross slide arranged so that gangs of tools can be placed in front or back of work, using each set of tools for separate operations. The tool block is slotted to suit the size of the shell to be turned. This machine is also equipped with a turret mounted on a cross slide on the carriage giving 5½-in. cross movement. The third arrangement is a turret mounted integral with the carriage, this arrangement being for boring only.

The swing over the ways is 18 in. and the longitudinal movement of the carriage is 28 in. The distance from the spindle nose to the face of turret is 32½ in. No countershaft is required. The driving pulley is mounted on the main shaft in the headstock, power being transmitted through two friction clutches with a pinion meshing with two gears on the spindle, giving speeds of 75 to 105 r.p.m. Starting, stopping and the two speed changes are controlled through one lever within easy reach of the operator. The driving pulley is 15 in. in diameter for a 6-in. belt. The head spindle is 38 in. long and has a 3¾-in. hole extending the entire length. The front bearings are 5½ in. in diameter and 6 in. long. The rear bearings are 5 in. in diameter and 6 in. long. The spindle nose is arranged for any standard make of chuck. The turret is of the round flat type arranged for four bars. It is 20 in. in diameter and 19 in. across tool clamps which are cast solid on the turret with a 3-in. hole in each clamp.

The carriage is of the double wing type and has a full bearing of 27 in. on the flat ways of the bed. The front bearing is 5 in. wide and the rear one 4 in., each being 27 in. long. The apron is of the heavy box type with an extra long bearing for the steel feed pinion and bronze worm gear. The feed is through friction and it is engaged and disengaged by a handwheel on the pinion shaft. For hand movement of the carriage a large pilot wheel is provided which is keyed to the pinion shaft.

The machine is equipped with a steel chip and lubricant pan and is arranged to be connected to a cutting compound supply system, but if desired will be furnished with an individual pump.

The floor space occupied measures 49 in. x 8 ft. The weight is 4600 lb. This size can be used for finishing shells up to 4½ in. in diameter. For larger shells it will be furnished in longer lengths.



A Single-Purpose Chucking Turret Lathe Designed for Turning, Drilling, Boring and End Forming Operations in the Production of Shrapnel and High-Explosive Shells

Taylor Memorial Meeting

For the meeting to be held in memory of the late Frederick Winslow Taylor in Philadelphia on Friday evening, Oct. 22, at Houston Hall, University of Pennsylvania, under the auspices of the Society to Promote the Science of Management, speakers are announced as follows: Rudolph Blankenburg, mayor of Philadelphia; Carl G. Barth, Louis D. Brandeis, James M. Dodge, Edgar F. Smith, provost of University of Pennsylvania; Henry L. Gantt, Dr. Harlow S. Person and Sanford E. Thompson.

Appreciations are to be read from Prof. A. Wallichs, Royal Polytechnic School, Aix-la-Chapelle; Henri Le Chatelier, Paris; Charles de Freminville, Paris; Charpy, director of St. Jacques steel works, and Prof. J. J. Sederholm, University of Helsingfors, Finland.

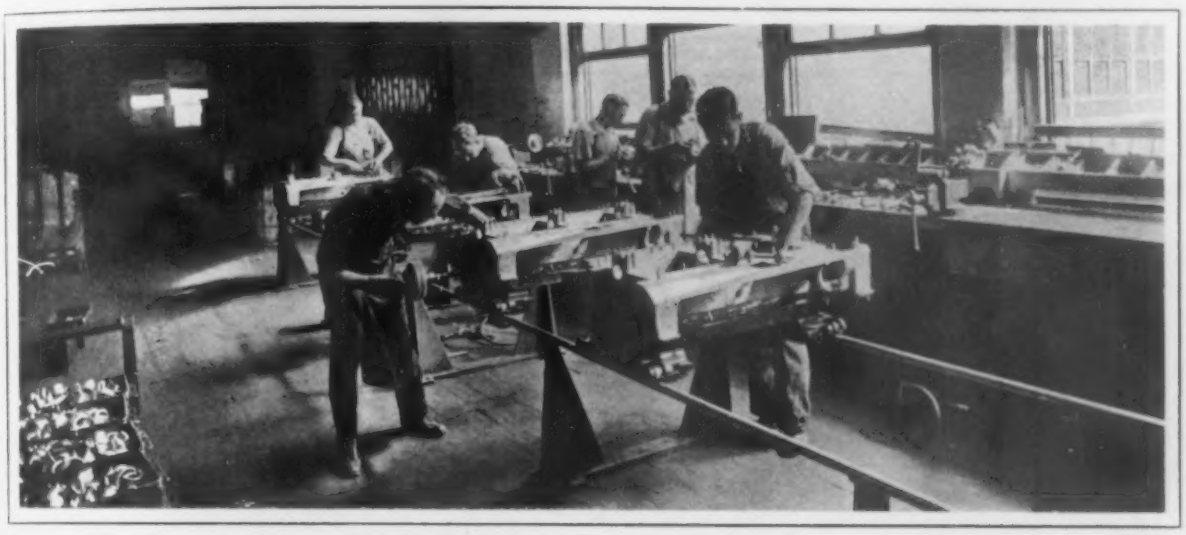
The society is to hold a meeting on Saturday afternoon at 4 o'clock at the Hotel Adelphia, for a reading of a paper by Richard A. Feiss, general manager of Joseph & Feiss, Cleveland, Ohio, devoted to the social service work at the Clothcraft Shops, and there will be a meeting in the evening for the discussion of this paper. In the morning the society will have a meeting at Mr. Taylor's home at Chestnut Hill, Philadelphia, and services are to be conducted at Mr. Taylor's grave in West Laurel Hill, at 12.30 p. m. Saturday.

Two additional 70-ton open-hearth furnaces are to be installed by the Broken Hill Proprietary Company at its new plant at Newcastle, New South Wales, because of the rapid increase in local demands for steel.

Assembling Motor Cars in Packard Plant

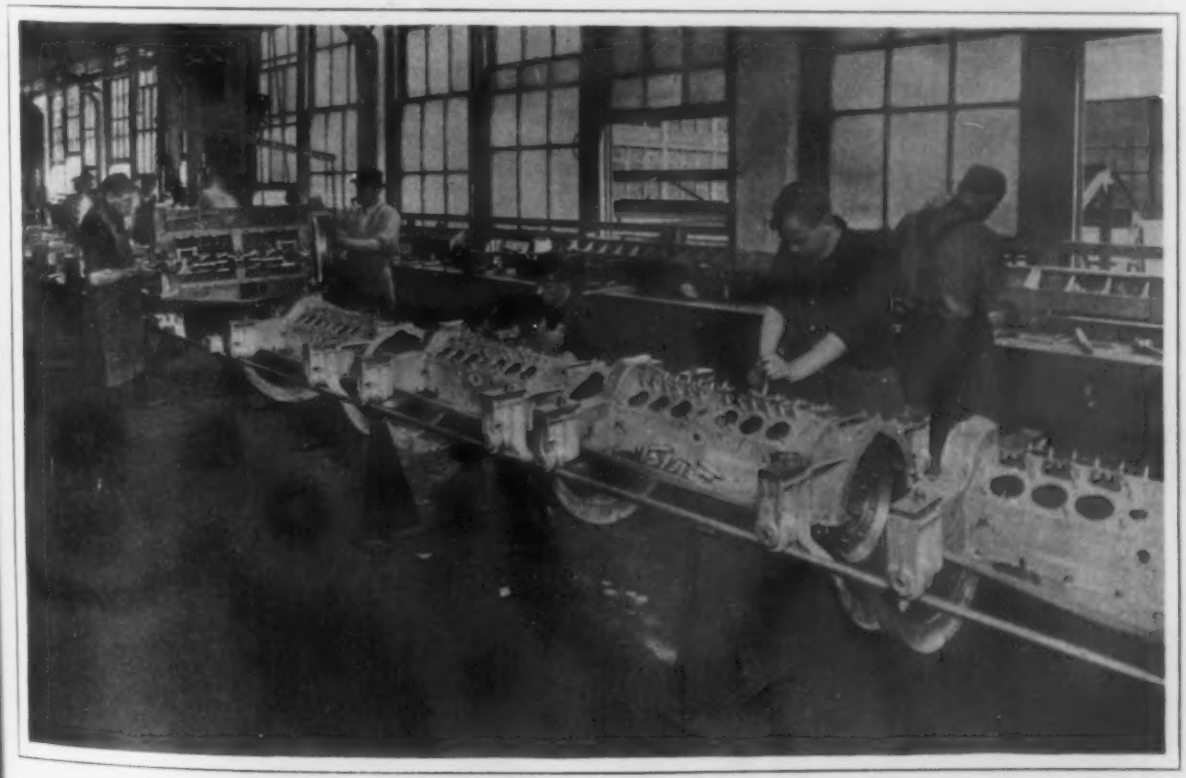
Conveyors Used for Carrying Engines and Chasses Slowly Through the Works as the Parts Are Brought Together

When the Packard Motor Car Company, Detroit, decided on a manufacturing program for the 1915 and 1916 manufacturing season, which included the production of 7500 motor carriages, it faced one of the largest problems in its history—that of providing sufficient assembly facilities. How the problem was met is shown in the accompanying illustrations, covering the two progressive assembly systems, one for the work on motors and the other for the bringing together of the various units in the automobile proper. To meet the demand for rapid assembly of the twin six motor, an entire rearrangement of the motor assembly department was found necessary, as the views serve to prove.

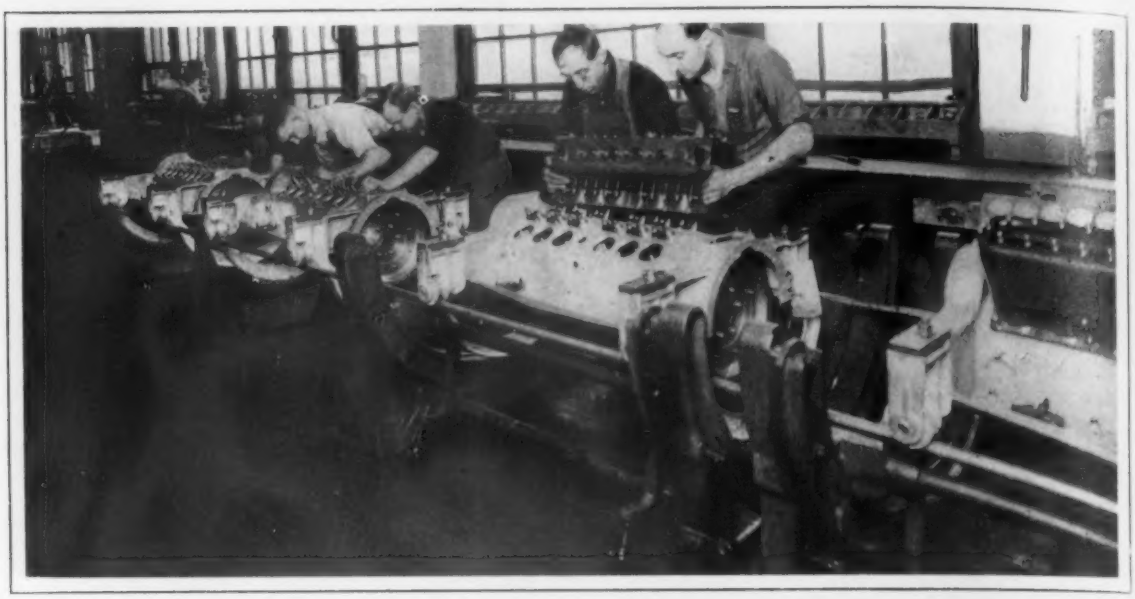


A hand power "railroad" made of 1½-in. piping, elevated on 18-in. cast-iron trestles, was provided with wheeled trucks or "skates" for carrying the motor along.

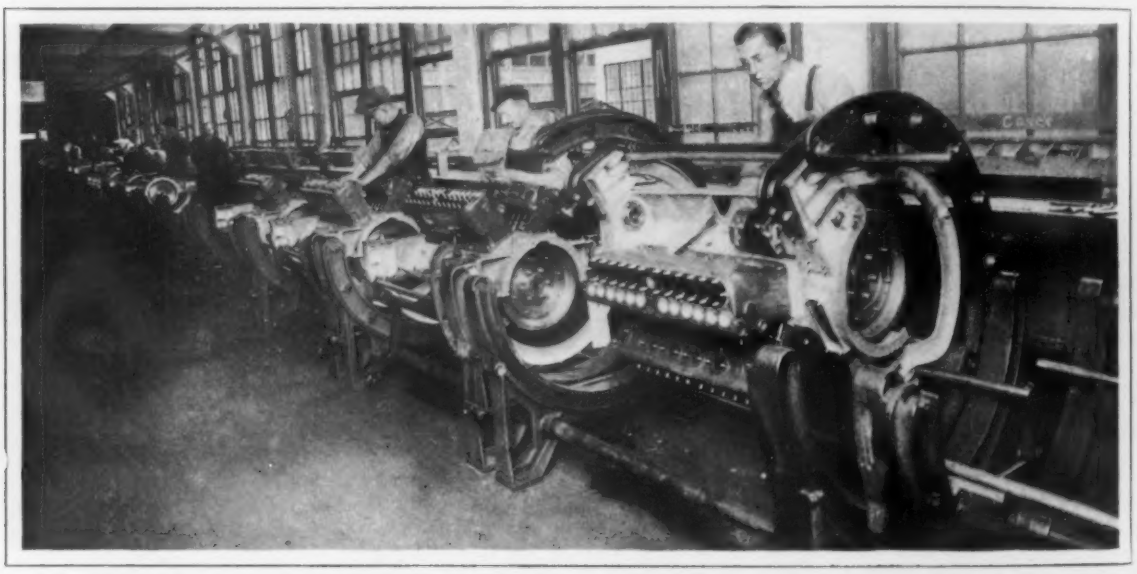
The 12-cylinder power plant starts through the motor assembly department as one-half (the upper) of an aluminum crank case. This crank case is placed upon one of the skates and a team of two workmen install the cam shaft and timing gears as the first operation. With three teams working on this operation, three cam shafts are fitted and the crank case moved along the track to the crank shaft station.



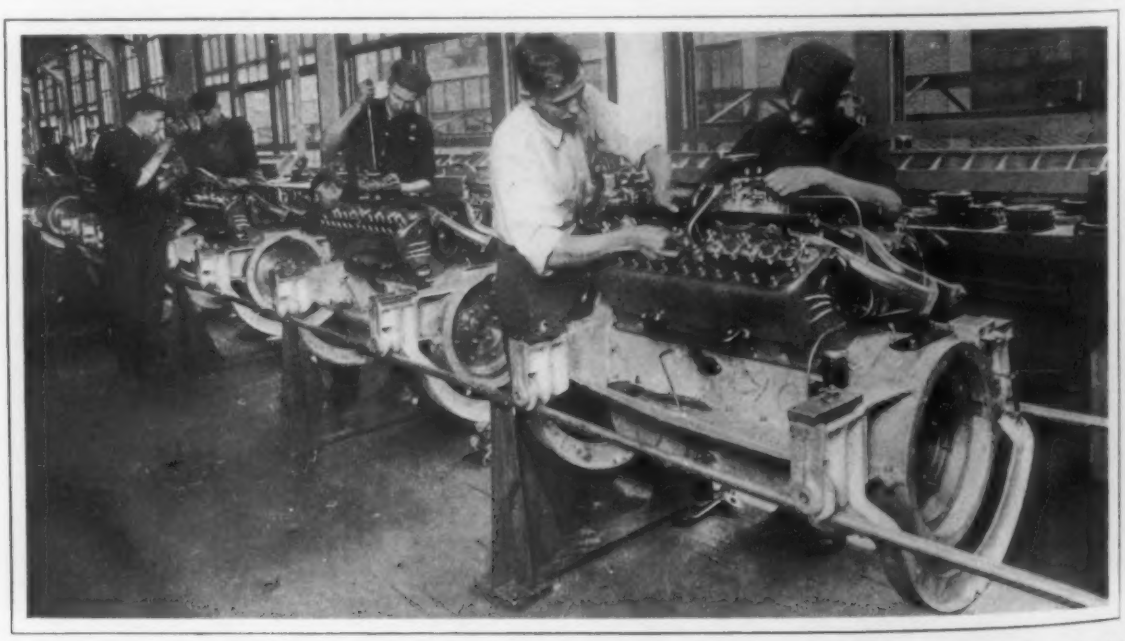
Here other teams apply the crank shaft, to which the flywheel has already been fitted, and fit the main bearings and various studs and bolts for successive operations. At this latter station, also, the lower half of the crank case, which forms the oil reservoir for the completed motor, is fitted, though it is not applied until the assembly has progressed considerably farther. This picture shows a change in the course of the motor assembly. Heretofore the crank case has been traveling crosswise of the track, but with the fitting of the crank shaft, it is turned over and placed endwise in a different type of truck or skate. At this point, the fitting of the valve tappets is accomplished.



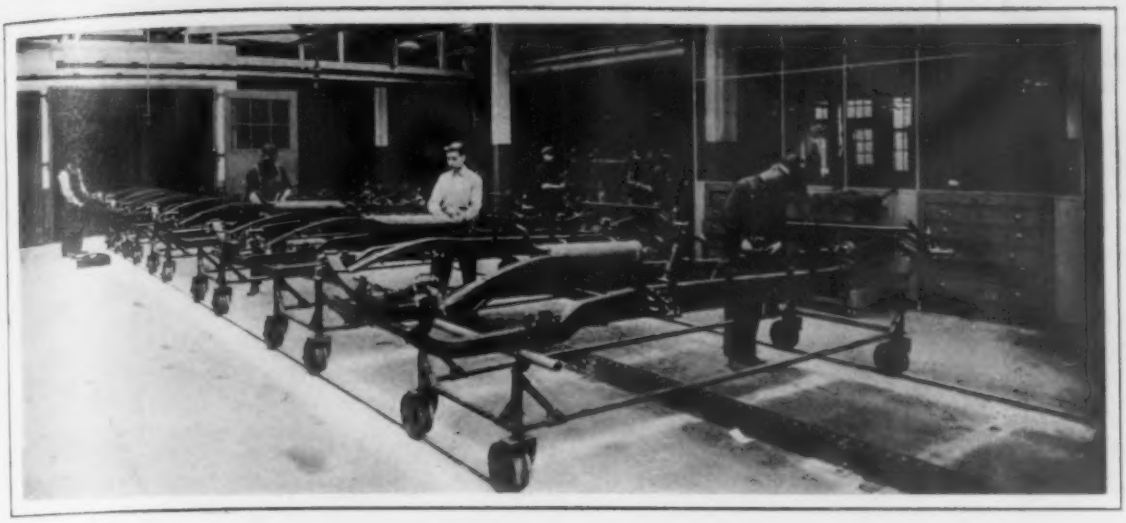
This picture shows the fitting of the two sets of cylinders to the crank case, the motor for the first time taking on the characteristic V shape in which it is finally placed in the chassis. At this station, the motor gets a still different sort of carriage, being placed in a revolving jack, in which it can be turned bottom-side-up or to any degree of the arc of a circle. This arrangement provides the utmost facility for further assembly, making any portion of the motor accessible to workman.



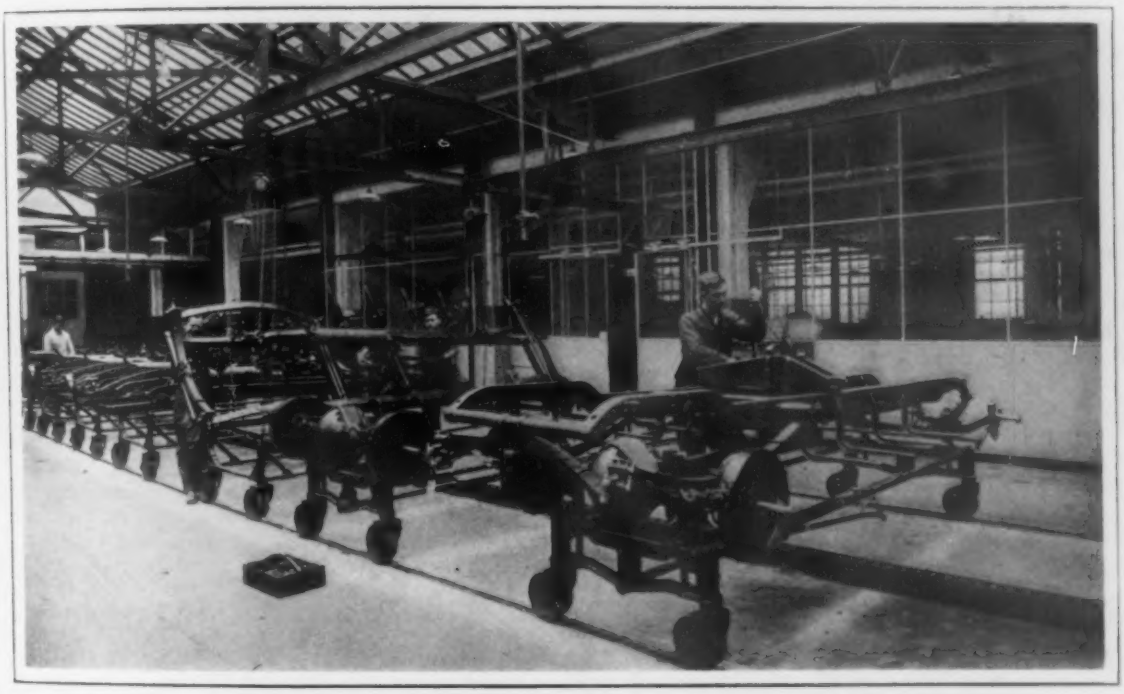
A close-up view of a motor held in a revolving jack, showing the assembly of the completed cylinders, the starting motor at the upper right corner, and the clamping method employed to hold the motor rigid in the jack while it is being worked on from various angles. Next beyond the intake manifold pipes, electrical equipment and other accessories, which form the finishing touches of the motor, are applied.



The final assembly operation on the motor. The two workmen in the foreground are adjusting the carburetor, which is shown at the top between the two sets of cylinders. The man to the left is making final adjustments on the electrical timer and distributer unit, through which current is carried to the spark plugs for the firing of the gas in the cylinders. From this point, after the fitting of the clutch assembly unit, the motor is carried on a special power conveyor across a wide room and down four floors to the chassis assembly stock room. Here it remains until needed, and is then swung into its place in the forward end of the frame by means of an overhead trolley system.



More than half a mile of special tracking is required for the chassis assembly. Long wheeled trucks, on which the frame of the motor carriage is carried through all the assembly operations to the completed car, operate on a track about 12 ft. wide. The motor power for this assembly is furnished by a special conveyor chain midway between the rails, and moving at a rate of 1 ft. per minute. This low speed is provided to allow for time for the various assembly operations and still to keep the work going forward constantly. The frame, bare except for the running board brackets which have been riveted to its sides, is placed on the truck and started on its journey. The first operation consists in applying front and rear springs and the muffler, as well as one or two cross members. The second stage finds the front axle attached, with steering apparatus in place back to where the lower end of the steering gear will engage it.



The frame is being turned over on its truck and the rear axle is being attached. At the right is shown the screened-in stock rooms, in which the various parts required for the assembly are stored until needed. Rear axle assemblies, motors and other heavy units are brought from this stock room on the over-head trolleys shown.

The first stages of the chassis assembly, showing in the extreme background where the bare frame starts and, in the foreground, the chassis assembled up to the point where it receives its first coat of paint. In the foreground a chassis has accumulated the motor, dash board, steering gear, one floor board, front axle, change speed and emergency brake levers, front and rear springs and rear axle. From this point, the chain conveys the chassis to a special cleaning booth, where by a combination of naphtha and compressed air, all foreign substances are removed from it and it is made ready for the first, or primer, coat of paint. The paint is also applied by spraying under compressed air and the chassis travels along to the special drying booth shown at the left. This super-heated booth is 126 ft. long, and since the 12-in.-per-minute pace is maintained here, the chassis is given 2 hr. 6 min. of travel through the booth for drying.

Successive operations of a like nature are gone through with, including repeated painting, varnishing and drying processes, and the chassis is conveyed to the final assembly room shown. Here it begins to take on the final, or finishing, units. In the long stock room shown at the right, the various parts are stored convenient to the hands of the teams of workmen. Piles of fenders, gasoline tanks, floor boards and other parts are constantly replenished for the stream of cars traveling the conveyor track.

The final assembly operation, the placing of the body. Held by an overhead trolley hoist, the body is lowered over the steering gear and bolted into place on the frame. At this point also the wheels, which have been equipped with tires in the stock room, are slipped on the oiled bearings of the axle. The completed car is run off the conveyor truck by a special arrangement of trackways, and through the final inspection department. Here it is turned over to inspectors for a road test which is designed to bring out any troubles due to faulty assembly. With these troubles remedied, the car is ready for the shipping platform and its journey to the ultimate consumer.

Effect of the War on Non-Ferrous Metals

The effect of the European war on the non-ferrous metal industry was discussed briefly before the recent meeting at Atlantic City of the American Institute of Metals by Thomas Forrester Wettstein, United Lead Company. His remarks were in part as follows:

The value of the products of the metal industries in this country is approximately 20 per cent of all American industries, from which some idea may be gained of their importance. Their economic value is, however, much greater, since metals are used so largely in all constructive work. The non-ferrous metals, being of much smaller tonnage than iron and steel and used so largely in modern warfare, were subjected to the widest fluctuations ever known as a direct result of the war.

While America is the largest producer of copper in the world, the production of zinc is normally more widely scattered and Germany is a very important factor in its production. The German exports of this metal having ceased, a heavy strain upon American production instantly made itself felt, with the highest prices on record as an immediate result. The fact was not generally known that for cartridge brass one or two exceptionally pure brands of zinc alone could be used, because of the presence of a percentage of lead in the more common brands used for galvanizing.

In lead, as in copper, it is thought that the increased consumption for war material is easily offset by the diminished demand in constructive fields. Present prices appear to confirm this reasoning.

Tin finds its uses chiefly in alloys of which solder and babbitts are perhaps the largest items, but little of this metal finds its way to war. There have been no such interruptions to the tin traffic in the last six months, and prices for this metal have steadily declined. This metal is normally highly speculative, and in ordinary times, fluctuations have been quite as severe and sudden, and covering as wide a range as during the past year. It is quite within safe bounds to say that of all metals, tin is least affected by the present war.

Antimony, used largely in alloys for bearings and for type, is the one metal seriously affected by the war. Its production is chiefly in the East, China and Japan together contributing the largest quota. The Mexican production was at one time very considerable, but because of the internal troubles of that unfortunate country, it ceased to be a factor some two years ago. The annual production of this metal in times of peace is scarcely 20,000 tons, all of which is consumed in constructive work. But the war has made heavy demands upon the supply and large tonnages are used for hardening bullets. The prevailing price of approximately 30 cents in New York, as compared with 6 cents thirteen months ago, seems to be amply justified. It is perhaps the only metal of the non-ferrous type, of which it can be definitely stated that its present high price is directly attributable to the war.

Trade School Course on Heat Treatment

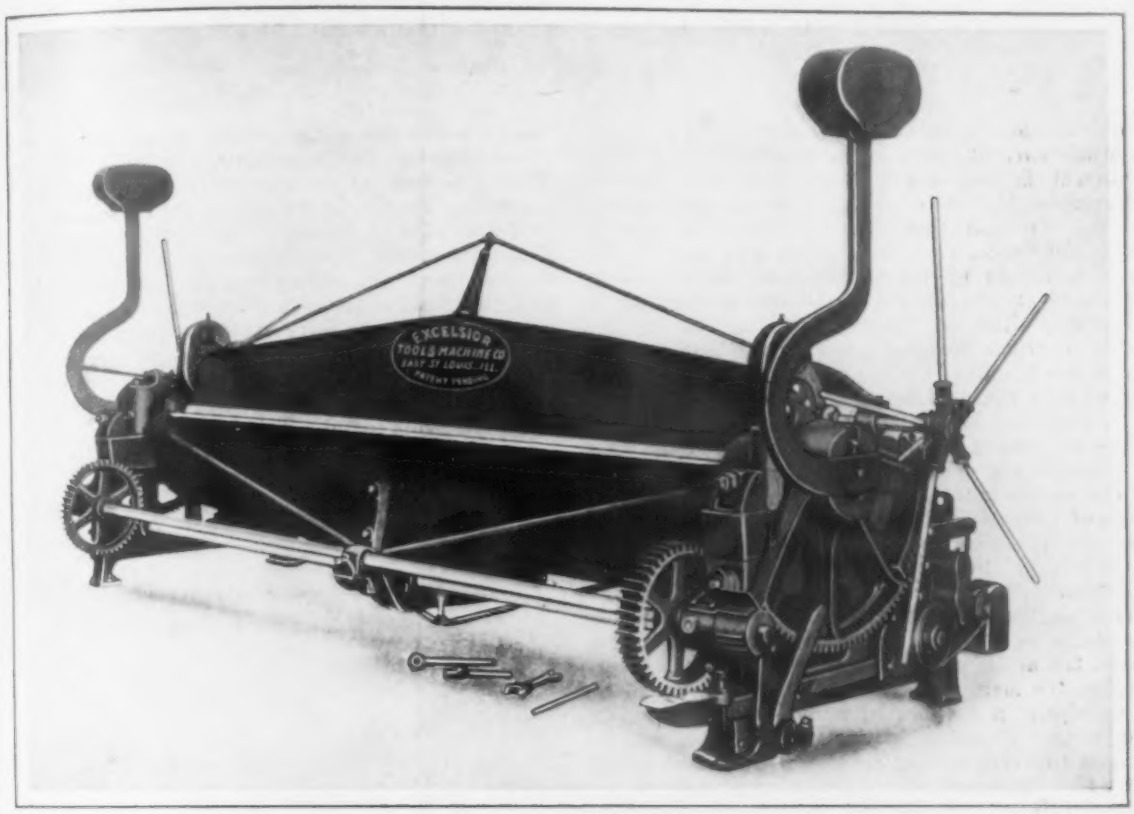
The Wentworth Institute, Boston, Mass., has added two new courses this year. One is a one-year day course in forging, hardening and tempering. It offers training in hand and machine work, including shop practice; machine sketching, drafting and blue-print reading, and several hours each week on the physical properties of materials, shop mathematics and allied subjects.

The second course is a one-year day trade preparatory course for young men who wish to enter some one of the manufacturing industries but need, say a year, to discover in which direction they show special skill and ability.

The H. W. Johns-Manville Company, Madison Avenue and Forty-first Street, New York City, has taken over the entire production and sales of the Victor Brass Works, New York City, manufacturers of plumbing fittings.

Power Flanging Brake for Sheet Metal

The Excelsior Tool & Machine Company, East St. Louis, Ill., has added a series of power flanging brakes to its line of sheet metal working machinery. These machines are built in seven different sizes for work ranging from 6 to 18 ft. in length and from ¼-in. in thickness down to No. 16 gage. In the construction of the machine operating clutches and levers have been eliminated as well as continually revolving shafts. The entire machine is operated by the pressing of a foot treadle.



Power Flanging Brake for Producing Square and Round Bends in Sheet Metal Less Than ¼ In. Thick and from 6 to 18 Ft. in Length

The upper or clamping leaf is operated by the pilot wheels on either end to clamp the metal. The normal rise of the upper leaf is 1¼ in., but provision is made to increase this to 5 in. by removing the tension blocks. This, it is emphasized, is an advantage where flanges from 1¼ to 5 in. deep are bent on two or four sides of the sheet. The edge of this leaf is of hardened and ground tool steel which is also employed for the shear blades. The bending leaf has steel inserted at all the wearing points of contact.

In designing the machine consideration has been given to the safety of the operator. With that end in view all exposed gears are guarded and the shafts do not revolve except when the machine is actually at work making a bend. At such times the latter are brought into action by pressing the foot treadle which is the only means required for operating the machine. When the treadle is pushed down it engages a friction wheel operating the bending leaf. This leaf, it is emphasized, stops without jerk or shock of any kind at the lowest point of the stroke and reverses automatically. Provision is made for bending to any angle and also for locking the treadle.

There are five reductions in speed from the motor which operates at 1700 r.p.m. to the bending leaf. The machine will make five complete bends per minute and the speed of the reverse is double that of the forward movement.

An Adjustable Guard for Circular Saws

An adjustable saw guard that can be locked out of the way by a simple latch and pin arrangement has been placed on the market by the Crescent Machine Company, Leetonia, Ohio. The guard is made with lattice castings on either side so that the saw is visible at all times, and it is possible to vary the relation of the guard to its point of support so as to adopt it to all makes of saw tables.

In operation the guard accommodates itself to the thickness of lumber to be sawed and will automatically return to its protective position after the work has been completed. When it is desired to hold the guard away from the saw temporarily, the latch on one of the supporting arms engages with a pin on the other to suspend the guard above the table. The guard is replaced in its regular protective position by a slight pressure of the finger on the latch, while if it is desired to swing the guard out of the way entirely, this can be done by loosening the handwheel on the short shaft running parallel with the saw blade.

A Guard for Circular Saws Which Can Be Locked Out of the Way by a Simple Latch and Pin Arrangement

The Electric Furnace in the Foundry—II*

Construction and Operation Based on Modern Experience—The Current, Transformers and Power Factor—Details of a Unique Tilting Mechanism

BY JAMES H. GRAY

The arc electric furnace may use either direct or alternating current. For commercial reasons alternating current is almost exclusively used and, for the same reasons, the use of 3-phase current is becoming more general than that of single-phase or 2-phase current. The voltage of the current used may be any voltage furnished by the power house because it is transformed at the furnace to the voltage required in the furnace, which is relatively low. As the arc is a form of electrical resistance, the voltage employed depends on the length of the arc desired. If we adopt the principle that the arc should be confined between the bath and the end of an electrode of considerable area, then the arc should be as short as possible, at the same time keeping the carbon electrode out of all contact with the molten bath. This condition is obtained by a voltage of about 45 volts at the arc. Where the electrodes are in series, then the voltage across the bus-bars is 100. If the electrodes are in series with the bottom connections, then the voltage is from 50 to 75.

When melting ferromanganese, where it is desirable to volatilize as little of the manganese in the arc as possible, the arc is made so short that it is practically hidden in the slag, and the arc voltage is just above that at which an arc can be struck, namely, from 25 to 30 volts. Where a long arc is desired, for instance, in furnaces having horizontal electrodes and in which no arc is struck with the bath, and where an arc 8 or more inches long is desired, arc voltages vary from 100 to over 200 volts.

For the transformation of current from high voltage to the low voltage used by the furnace static transformers are preferable. Rotary transformers have frequently been used for this purpose in Europe, but as the loss of power in the rotary transformers is 15 per cent or more as against 1½ per cent in the static transformer, the difference in cost of current at the furnace is considerable. Also, the rotary is one more piece of machinery to look after.

Separate transformers may be used for each phase, or all the phases may be included in one transformer, as, for instance, one 3-phase transformer for three electrodes. The single transformer is slightly cheaper, but an injury to one phase of the transformer may mean the ruin of the other phases, which would not be the case with separate transformers for each phase. Two transformers may be used on a 3-phase circuit by running on open delta, but the advantage is questionable. Either air-cooled or water-cooled transformers may be used. If the latter, the water after passing through the transformer may be passed through the water-cooling system of the furnace. The telltale of the furnace may be used as that of the transformers and is always within view of the furnace operator. If the water ceases to flow through the furnace coolers the current would naturally be cut off, thus automatically protecting the transformers.

FORM OF CONDUCTOR AND AMOUNT OF COPPER

With furnaces of larger size, where heavy currents up to 18,000 amperes per phase are used, and with other conditions seldom found in ordinary electrical work, the doctors do not always agree as to the best form of conductor and the amount of copper which should be used to carry these heavy currents from the transformer to the electrodes. The most satisfactory construction is that of bus bars instead of insulated cables, and I am using on the furnace a cross section corresponding to 800 amperes per sq. in. of copper. Where flexible cables are used in order that the furnace may be tilted, the cables should be bare cables and may also be loaded to 800 amperes per 1,000,000 C.M. Of course, it is common practice to load copper heavier than this, but as both the bars on the furnace and the flexible cables are in warm places, and it is not comfortable to have cables twisting and bars rattling under heavy loads or surges of current, I think the investment in copper is advisable. If aluminum conductors be used, sizes will be varied to conform to the use of this metal. Table 2 shows how the proportions of copper mentioned above have been successfully applied to furnaces of various sizes.

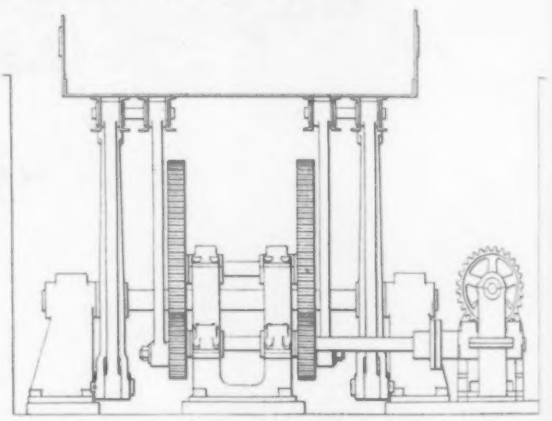


Fig. 5—Details of the Gear Train of the Tilting Mechanism Electrically Operated

Table 2—Proportions of Copper Successfully Applied to Various Sized Furnaces

Size of Furnace, Tons	Transformer Capacity, Kva.	Amperes Each Phase	Square Inches Copper Each Phase	Number of ¼-In. Copper Bars Each Phase	Number of 1,000,000 C. M. Flexible Cables Each Phase
15	3,000	18,000	22.5	10 9-in.	24
10	2,000	12,000	15.0	8 7.5-in.	16
6	1,200	7,200	9.0	6 6-in.	9
4	900	5,400	7.0	4 7-in.	8
3	750	4,500	5.5	4 4.5-in.	6
2	600	3,600	4.5	4 4.5-in.	4
1	375	2,250	2.75	2 5.5-in.	4 (600,000)

Referring to the transformer capacity used with the various sizes of furnaces in the table, it will be noticed that for the 6, 10 and 15 ton sizes 200 kva. per ton are used, and that for smaller sizes the kva. per ton increases as the size of the furnace decreases. So long as current is on the furnace, loss of energy by heat radiation goes on and as the consumption of kilowatts per ton of product is affected by the size of the divisor and as the radiation per ton is greater in the small furnaces, it is advisable to cut down the time during which radiation acts by making quicker heats on the smaller furnaces. Also in general the requirements of the steelmaker, making small heats, demand that the heats come close together.

THE STEEL-MAKING OPERATIONS

In making high quality steel there are two periods to consider. One is the period during which the charge is being melted down. At that time the scrap has an infinite capacity for absorbing heat, and if the arcs are buried in the charge an extraordinary amount of heat

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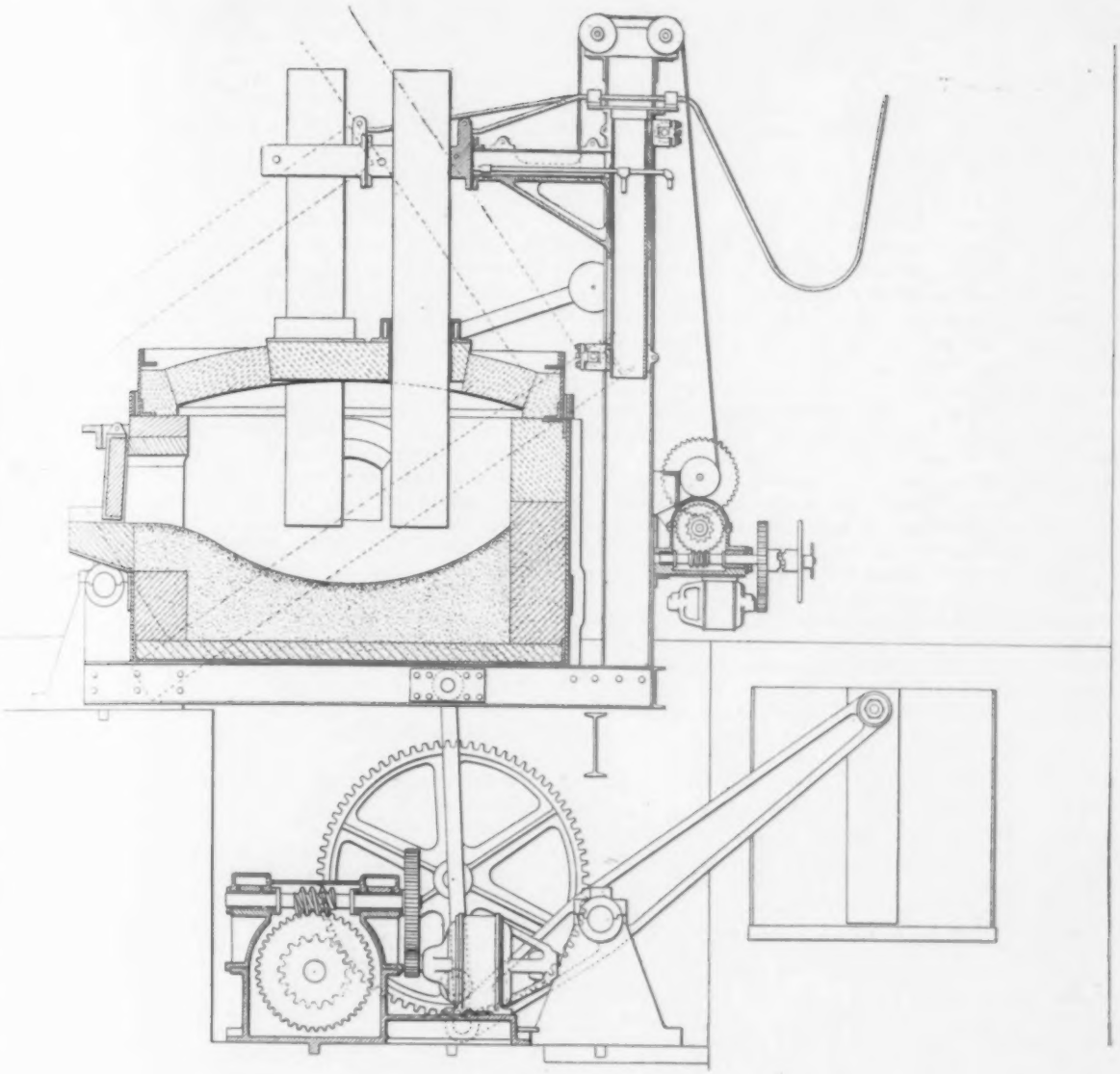


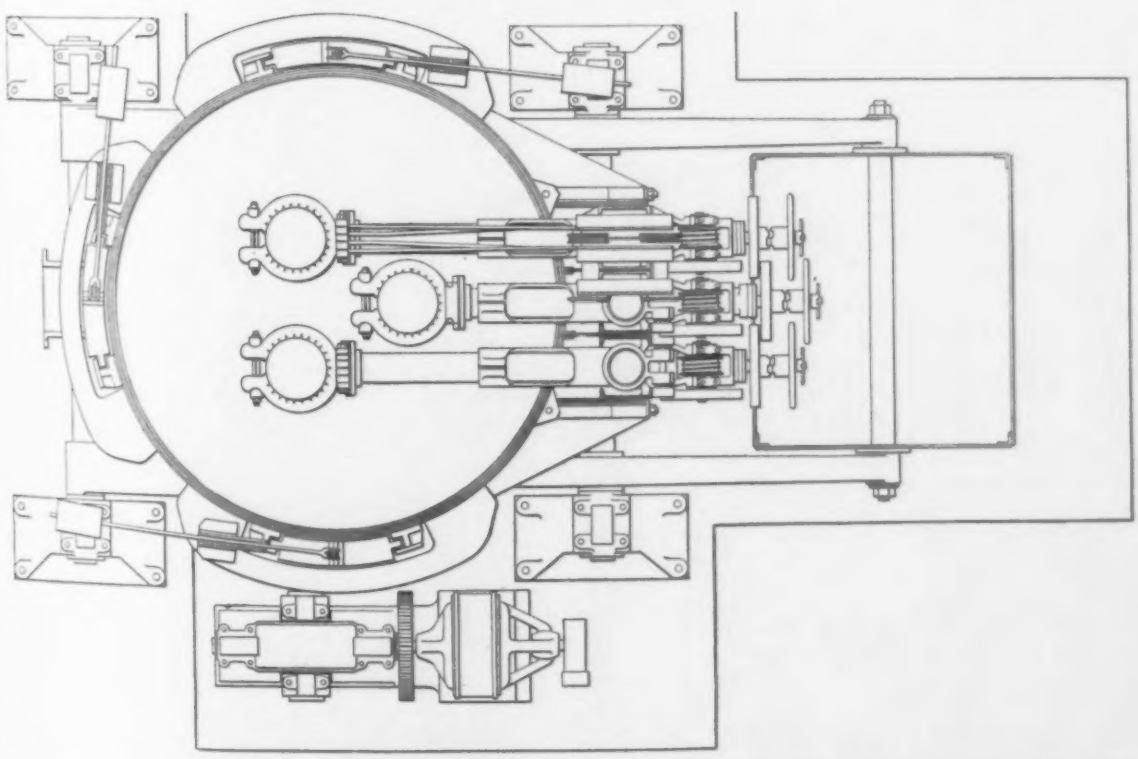


Fig. 6 (Upper) Represents the Sectional Elevation of a Small Electric Furnace Showing the Details of the Electrically Operated Tilting Mechanism, the Dotted Lines Representing the Pouring Position. The spout remains practically stationary. Fig. 7 (Lower) is a top view of the furnace.

may be applied without overheating the furnace itself. The second period is that during which the purification and deoxidation of the molten bath is performed—the steel-making period.

The refining and deoxidation, accomplished by chemical reactions between the bath and the slag, cannot be shortened by forcing in current. In fact, when the charge is molten and hot, its capacity for absorbing more heat is gone, and the walls and roof of the furnace cannot withstand an excessive temperature. Therefore the supply of kilowatts must be cut down during the second period. Why not, then, further shorten the first or melting period by still greater application of kilowatts? Firstly, the power company usually bases its charges for current on the maximum demand, and in order to protect ourselves during times in which the production is small for commercial reasons and during other periods of shut down, and considering the relation between the power consumption during the two periods just referred to, we must compromise as to how heavily we power the furnace. Also such practical considerations as sizes of electrodes, transformers, weight of copper used and other points of furnace design must be thought of. The current capacities given in Table 2, though by no means fixed, have been found in practice to fulfill the conditions just mentioned.

All the above has been on the assumption that cold charges are to be melted. Where molten metal is transferred from a Bessemer converter or open-hearth furnace to the electric furnace for further refining, the problem is much more simple, and a capacity of from 100 to 150 kva. per ton has been found ample.

THE POWER FACTOR DEFINED

With alternating current, if pressure and current are in unison of phase, the product of these two gives the power available. Various disturbing influences cause a lag in the current phase, in which case the available power is less than the product of the two. The ratio between these two conditions is called the "power factor" and is expressed in percentage. If care be taken in the design of the furnace with regard to the disposition of the conductors with reference to each other, and to iron parts which may surround or lie close to them, the power factor may approximate 100 per cent.

Although in many kinds of work the men from whom power is obtained are content with a power factor as low as 80 per cent., nevertheless, a high power factor is considered desirable and some power companies even allow a bonus on the power bill varying with the amount the power factor is above a given per cent. A well designed arc electric furnace using as high as 60-cycle current should have a power factor of over 90 per cent, and many steel furnaces have a power factor of 95 per cent, furnace and transformers combined.

The electrodes of the electric furnace are heavy and must be lifted and lowered by suitable machinery to conform to the length of arc required to give the desired quantity of current flow. This mechanism is preferably operated by motors and the impulses given the motors require the use of automatic regulators detached from the furnace. The prime requisite is that they may be so dependable that the furnace operator may forget their existence and give all his attention to the steel-making operation, just as we forget about the automatic regulator in an arc lamp. Another duty of the regulators is to keep the different current phases, employed on the furnace, balanced so that the power factor may not be disturbed and that the load may be satisfactory at the power house.

To operate the electrode lifting mechanism by hand is an arduous task on large furnaces, besides requiring the attention of operators which should be employed elsewhere. The inability of the hand operator to avoid short-circuits and surges on the line may be minimized by the use of reactance in the transformers, or by coils at the furnace and regulators at the power house, but these devices are expensive and not as satisfactory as the automatic regulators.

THE FURNACE SHELL AND TILTING MECHANISM

As in other furnace construction, the design of the shell of the furnace should be concerned with having a structure which will retain its form under the difficult condition of containing brick work which expands with heat. Also it must be rigid enough to carry the electrode supports without warping and getting the electrodes out of alignment. As the roof has to be replaced oftener than the side walls, the iron work which carries the roof should be easily removable. This makes it difficult to use the usual buck-stay and tie rod construction of the open-hearth furnace. This necessity is obviated if the furnace be made circular in form.

The drawing out of a viscous slag, maintaining a tap hole when making heats every 1½ or 2 hr. when refining molten metal, etc., make it desirable to have the electric furnace tilting or rolling instead of stationary.

If the furnace rolls, the spout descends below the floor level when pouring. This is not an objection while pouring heats from furnaces of larger sizes into a ladle in a pit. With smaller furnaces, where it may be desirable to pour directly into bull ladles, it is convenient to have the furnace tilted about a hinge located near the spout, so that the spout remains practically stationary during pouring. Various devices have been used for tilting, both hydraulic and electric. Hydraulic power is not always available, and considering cost of maintenance, of operation and convenience in general, the electrical means is probably better.

Figs. 5, 6 and 7 show a design of electrically operated tipping machanism which has proved very satisfactory in service. The furnace is lifted by means of connecting rods attached to a large gear wheel. The large wheel is driven through spur and worm gearing by a motor. An advantage of this arrangement is that if the operator fails to cut off the current from the motor the furnace can do nothing but descend to its original position, and at the bottom and top positions of the stroke no matter which way the controller is operated the furnace will move in the desired direction. In the illustration is shown a counterweight which operates through levers to balance the weight of the furnace. With larger furnaces which rest on rockers the counterweight is not used, but in both cases the wheel and connecting rod arrangement give a very smooth and readily controlled motion to the furnace.

THE ELECTRIC FURNACE IN THE FOUNDRY

The standard of excellence in steel was formerly crucible steel. The inventors of the electric steel furnace aimed to produce steel equal in quality to crucible steel, but in such quantities that the cost of production would be lowered to a point where the margin of profit in tool steel would be increased, and high quality steel be made available for uses for which crucible steel was to expensive.

Although the first commercial electric steel furnaces were operated in France and Sweden and then more generally adopted in Germany, it was in America that the possibility of using electric steel for lower-priced products, such as rails, was first recognized. And it was here that the first 15-ton units were installed, also that 3-phase current was first used on steel furnaces. Although the cost of electric steel is still higher than that of open-hearth steel made in plants of large producing capacity, it appears likely that when electric installations are made of such a size that the production of a given plant equals that of a large open-hearth plant the cost will not be enough higher to be prohibitive.

To accomplish this the electric furnace will be used as a finishing furnace, drawing its partially refined molten charge from either the Bessemer converter or the open-hearth furnace, or from the combination of these in the duplex process. These remarks apply also to the production of electric steel for large castings which sell at a low price. Already the electric furnace of small sizes is successfully competing with the crucible and the small converter, either melting cold charges or refining molten metal.

To compensate for the cost of electric current considered as a fuel the possibility of using lower-priced materials is an advantage to start with. As the crucible does no refining, materials for the charge must be of high quality and price, and the cost of crucibles and

labor are important items. In the small converter a fairly high-priced pig iron must be used, and the metal loss from cupola to ladle is high. Cost of production is always high from small units, and even now the cost of production in an electric furnace is close to the cost of production from a small open-hearth furnace yielding the same amount of steel per hour or per day, and the advantage is with the electric furnace as regards its flexibility, inasmuch as it can be shut down overnight or over Sunday without keeping heat on and without damage to the furnace.

THE QUESTION OF QUALITY

A greater consideration than cost is that of quality. The freedom from oxides and the low sulphur content of electric steel make it desirable for small castings. The ease with which the desired analysis may be obtained, either as regards carbon or the other elements, and the fact that alloys may be added in the furnace without loss of these expensive metals is a great advantage. It is thus possible to complete the entire steelmaking operation in the furnace and not resort to additions in the ladle. Also the higher density of this steel, as evidenced by freedom from blow holes and greater specific gravity, and better physical qualities when tested should be recognized. As heat treatment is everyday being more generally considered a necessity, electric steel best fulfills its purpose because of its great uniformity in results, freedom from cracking, and adaptability to greater ranges of temperature under heat treatment.

For certain purposes it is desirable to have numerous small very hot heats instead of fewer large ones. Steel of such high temperature as to readily pour small castings even in lots up to 5 tons can be obtained from the electric furnace without difficulty. The fact that the metal is free from oxides makes it possible to pour at these high temperatures without having wild steel. The excellence of electric steel, both as regards physical qualities and freedom from defects in machining, whether heat treated or not, has led to its adoption for larger-sized castings, such as knuckles for car couplers, locomotive cross-heads and castings of larger size used in particularly difficult service where quality and not price is the first consideration.

The electric furnace is now being successfully used to refine cupola iron for making malleable castings, and it is probable that a similar process would be valuable for making high-grade gray iron castings.

I have merely touched upon a few points in connection with the adaptability of the electric furnace to foundry purposes, but judging from the world-wide interest being taken in the electric furnace and the comparatively large number of units already installed, it seems probable that their use will become very general. As both steelmakers and foundrymen see their way to install units of large capacity, I predict that the annual production of electric steel will assume very noticeable proportions when compared with the tonnage of steel made by the older processes.

(*The End.*)

Pennsylvania's Safety Congress

The third annual Industrial and Public Welfare and Engineering Conference of Pennsylvania will take place in Harrisburg, Pa., Nov. 16, 17 and 18. An exhibit of the products of the State's safe, economical and efficient industrial development and of what the industrial and public service companies are doing to promote the health and welfare of the people will be an important feature from Nov. 15 to 19.

The use of hoods for brass melting furnaces, for core ovens and for ventilated foundry stoves is taken up at some length in the safety bulletin for September, issued by the National Founders' Association, M. W. Alexander, West Lynn, Mass., chairman of the committee on safety and sanitation. The bulletin also illustrates discharge spouts for sand and small casting work, and offers a sketch of a wire screen shelf for bench molders.

Saws and Other Tools of Non-Rusting Alloys

A series of alloys of cobalt, chromium and iron, with low carbon content, containing about 20 per cent of chromium, and in which the iron content has been gradually increased from 10 per cent to 75 per cent has been prepared by Elwood Haynes of Kokomo, Ind. Such alloys are claimed to show little variation in either chemical or physical properties so long as they contain 5 per cent or more of cobalt and from 20 to 25 per cent of chromium. They are all readily malleable at a bright red heat and can be worked into sheets or rods from cast ingots without difficulty. These alloys receive and retain a luster and are much less subject to oxidation or other changes in the atmosphere than the binary alloys of iron and chromium alloy.

Such alloys, containing a constant percentage of chromium (20 per cent) and varying from 5 to 75 per cent in iron (at intervals of 10 per cent) and from 70 to 5 per cent in cobalt, made into bars, ground smooth and covered with a strong solution of ammonium chloride, failed to show the slightest stain or tarnish after several days. While they are distinctly softer than those of cobalt and chromium, covered by previous patents, they have the peculiar advantage of being incorporated into saws, boring tools, etc., which possess sufficient hardness for wood-working tools. They can also be worked almost as readily by the file as similar steel implements. Other advantages are described in the original patent, as well as the method of manufacture.

Tools of some of these alloys are represented as hard enough to permit easy working of wood, bone, ivory or soft metals and are easily sharpened at ordinary temperatures; knife blades, saws, etc., may be given their shape and edge during working and the edge will be retained on cooling.

These alloys are covered by a patent, U. S. 1,150,113—Aug. 17, 1915. Mr. Haynes calls them noble alloys, because they possess characteristics similar to those of alloys of cobalt and chromium, which suffer no alteration in their surfaces by exposure to acids, oxidizing influences, etc. In general this latest invention is described as a noble alloy containing cobalt and chromium together with iron as a third or softening metal, with not over 4 or 5 per cent of other metals and but little carbon.

A New Metal for Motor Construction

A new metal that is intended to fill the gap between iron and aluminum, combining lightness on the one hand and strength on the other, has been produced by G. A. Krause, vice-president and general manager of the Polyplane Motor & Metal Mfg. Company, St. Louis. Mr. Krause states that municipal testing laboratories find it to have the following properties:

Grade	Specific Gravity	Tensile Strength, lb. per sq. in.
1	1.92	35,000 and over
2	2.04	29,000 and over
3	2.12	23,000 and over
4	2.16	21,640 and over

The inventor has named the metal "krauselium" and it is expected that its principal development will be in connection with motor building.

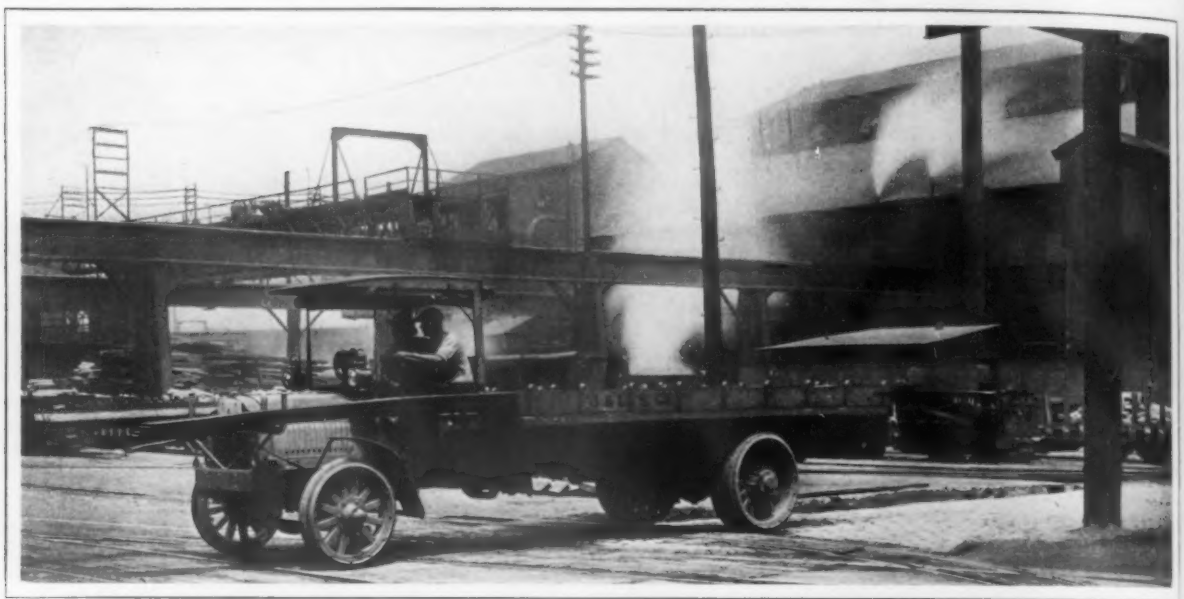
Magnesite from Canada

Large deposits in the township of Grenville, Quebec, Canada, which show 70 to 80 per cent of magnesia, are being worked by the North American Magnesite Company of 180 St. James Street, Montreal. The plant for dead-burning and preparing the mineral is at Calumet, Quebec. The company is supplying several steel companies with magnesite.

The Bradford Air Spring Company, capital $25,000, Bradford, Pa., has been incorporated to manufacture air springs for motor vehicles, by J. A. Frouenheim, W. W. Hughes and F. M. Nash.

Motor Truck for Handling Long Steel Bars

To deliver its products to dealers or consumers or for railroad shipment the Jones & Laughlin Steel Company, Pittsburgh, Pa., has installed a Packard 4-ton worm drive motor truck. It is equipped with an especially heavy platform body with low side boards and a special steel support attached to the bumper beam at the extreme forward end. Material of short and medium lengths is carried in the body, while the forward braces or cradles enable long bars or strips to be handled readily.



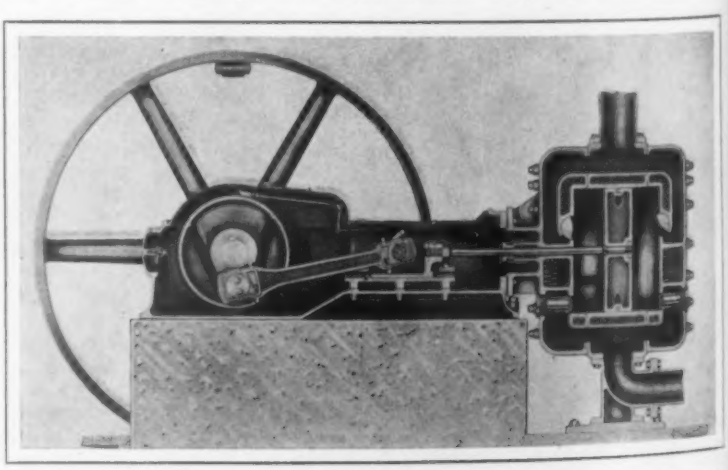
A Motor Truck Equipped with a Special Body and Brackets for Transporting Long Bars and Strips of Steel

The various means of conveyance employed in a steel plant is to be noted in the accompanying illustration. In addition to the motor truck, an overhead electric crane and the special steel industrial railroad cars are also illustrated.

Small Clearance Duplex Vacuum Pump

For use with condensers and for general service in other lines where a high degree of vacuum is desired a line of steam and power driven duplex dry vacuum pumps has been placed on the market by the Ingersoll-Rand Company, 11 Broadway, New York City. In general, the design follows that of the builders' line of Imperial air compressors, but the features about the pump which tend toward small clearance include the use of Corliss type intake valves and direct lift poppet discharge valves in the bottom of the cylinder heads. Another point about the pump is the reduction in the amount of floor space required as compared with the straight line type machines, on account of the duplex construction.

The vacuum cylinders differ somewhat from the ordinary construction employed in this type of machine. The intake valves are of the Corliss type and are located in the cylinder head to give a very low clearance. It is emphasized that the valve is rapid and positive in action, and as its movement does not depend on the cylinder or intake pressures, the pressures within and without the cylinder are practically equal. The low clearance provided, it is pointed out, prevents the air trapped in the clearance spaces at discharge pressure from reaching sufficient volume upon being expanded to intake pressure as to limit the reduction in pressure that can be secured. The discharge valves are of the direct-lift poppet type. They are located in the bottom of the cylinder heads with a view to discharging immediately any entrained moisture or water. In this way, it is emphasized, moist or even saturated vapor can be handled without trouble. The valve partly fills the discharge port in the cylinder head and the clearance at this point has also been reduced. Both the intake valves and the discharge passages, together with the cylinder and cylinder heads, are water jacketed to reduce the temperature of the air passing through them.



A Duplex Dry Vacuum Pump Employing Corliss and Poppet Valves to Reduce Cylinder Clearance

These machines are built in capacities ranging from 798 to 7048 cu. ft. per minute for both atmospheric and 5-lb. discharge pressures. The machine consists of two identical units of like capacity united by one common frame with cranks 90 deg. apart. This makes it possible to remove one connecting road and operate only one-half of the machine if that is desirable.

Germany's Steel Output for August

Official returns of the Association of German Iron and Steel Masters place the August output of pig iron at 1,050,610 metric tons, a little less than that of July, which was 1,064,889 tons. The daily rate was 33,890 tons against 34,350 tons in July. The production in August, 1914, was 586,661 and in August, 1913, it was 1,640,016 tons. The August output this year was made up as follows: Foundry iron, 204,967 tons; Bessemer iron, 19,134 tons; basic or Thomas iron, 638,990 tons; steel-making iron and spiegeleisen, 160,107 and forge or puddle iron, 27,412. The output for the first eight months of 1915 was 7,632,450 tons against 11,436,801 tons to Sept. 1, 1914.

Huge Iron, Steel and Machinery Exports

August Tonnage Figures Far Ahead of July—Machinery Exports Keep Up to High Level—Imports Still Recede

WASHINGTON, Oct. 12, 1915.—Exports of iron and steel took another giant stride in August, according to figures just compiled by the Bureau of Foreign and Domestic Commerce. The striking contrast between the month's shipments and those of August, 1914, is due, of course, to the fact that the war began officially in the early part of August, a year ago, and immediately affected both the import and export trade. Imports have not recovered any of the lost ground but exports have been so stimulated by the demands of the belligerent nations for war material and other manufactures that shipments of iron and steel have far outstripped the comparatively high level of 1913. A gain in tonnage exports of no less than 366 per cent for the month and of 100 per cent for the eight months is recorded. Shipments of machinery increased 142 per cent in August and 18 per cent for the eight months ended August, 1915.

The exports of iron and steel for which quantities are given aggregated in August 401,298 gross tons, as compared with 86,598 tons for the same month a year ago and 209,856 tons in August, 1913. It is interesting, in this connection, to note that the shipments in July of the current calendar year, which established a record to that date, were but 368,893 tons. The total for the eight months ended August was 2,077,783 tons, or almost exactly twice the total for the same period of 1914, which was 1,046,347 tons. The total for the eight months of 1913, when shipments were making a new record, was 1,954,340 tons. Numerous items make up the increase in exports in August, bars and billets intended for the production of shells and shrapnel, rails, steel plates, and wire making the heaviest gains.

Totals of the exports of these tonnage commodities in August and for the eight months ended August, 1915, as compared with the corresponding periods of 1914, are as follows:

Exports of Iron and Steel—Gross Tons

	August		Eight Months	
	1914	1915	1914	1915
Pig iron	2,918	18,567	83,299	127,607
Scrap	1,460	8,818	28,953	30,093
Bar iron	593	4,005	3,357	20,043
Wire rods	854	13,000	39,236	104,072
Steel bars	5,271	42,327	73,016	261,698
Billets, ingots and blooms, n. e. s.	2,714	89,134	32,613	353,119
Bolts and nuts	693	2,767	10,710	12,887
Hoops and bands	413	3,675	6,188	15,888
Horseshoes	40	3,109	740	13,302
Cut nails	132	220	2,944	2,485
Railroad spikes	796	596	5,500	4,238
Wire nails	1,133	11,272	19,349	56,876
All other nails, including tacks	152	754	1,676	5,196
Pipes and fittings			*104,487	
Cast pipes and fittings	6,130	2,606	†12,842	30,450
Wrought pipes and fittings	7,111	11,152	†17,732	83,615
Radiators and cast-iron house heating boilers	363	137	2,453	1,323
Steel rails	10,030	52,040	129,265	178,434
Galvanized iron sheets and plates	2,179	9,263	26,949	57,796
All other iron sheets and plates	628	1,983	5,979	11,577
Steel plates	7,184	30,460	78,644	138,760
Steel sheets	6,892	5,422	89,216	62,788
Structural iron and steel	15,851	22,848	134,167	139,191
Tin and terne plates	5,296	21,939	40,058	82,794
Barb wire	4,753	20,596	47,647	140,147
All other wire	3,012	24,613	49,327	146,404
Total	86,598	401,298	1,046,347	2,077,783

*Figures for 6 months January to June inclusive.
†Figures cover period since June 30.

MACHINERY EXPORTS

It was hardly to be expected that the enormous exports of machinery reported for July would be materially exceeded in August; nevertheless a gain was recorded, the total being $11,439,291, as against $11,409,623 for July. The shipments in August, 1914, which, as already stated, were affected by the outbreak of the European war, totaled only $4,759,663. In August, 1913, the total was $10,545,388. Metal-working machinery again overshadowed the list, the August exports being valued at $3,624,411, as compared with $298,259 in the same month of 1914 and $1,375,923 in August, 1913. The total for the eight months ended August was $79,396,113, as compared with $67,322,446 for the same period of 1914. High water mark in the exports of machinery for the eight months ended August was reached in 1913 when the total was $87,375,865. It is significant that, while increases in exports of machinery were limited early in the present calendar year to metal-working tools and engines, gains were recorded for the eight months of 1915 in no less than 16 items, including cash registers, stationary gas engines, other engines and parts of, milling, oil well and other mining machinery, and paper mill, refrigerating, shoe-making, sugar-mill and textile machinery.

The imports of iron and steel for which quantities are given amounted to 27,560 gross tons in August, as compared with 28,572 tons for the same month of 1914 and 18,740 tons in August, 1913. Imports of pig iron and steel billets declined but receipts of steel rails about offset this shrinkage.

The details of the imports of tonnage commodities in August and for the eight months ended with August, 1915, as compared with the corresponding periods of 1914 are as follows:

Imports of Iron and Steel—Gross Tons

	August		Eight Months	
	1914	1915	1914	1915
Ferrosilicon	1,113	86	4,586	3,632
All other pig iron	12,765	10,819	83,155	51,844
Scrap	3,469	3,795	22,351	20,689
Bar iron	1,615	560	13,433	5,782
Structural iron and steel	1,909	127	8,104	1,153
Steel billets without alloys	187	81	1,694	1,116
All other steel billets	3,459	788	27,939	7,292
Steel rails	2,070	10,801	11,340	54,373
Sheets and plates	271	165	3,121	857
Tin and terne plates	1,542	50	14,612	2,189
Wire rods	172	288	5,491	3,256
Total	28,572	27,560	195,826	152,183

The following table shows the total exports of machinery for the month of August and for the eight months ended August, 1914 and 1915:

Exports of Machinery

	August		Eight Months	
	1914	1915	1914	1915
Adding machines	$28,511	$45,190	$1,084,979	$313,720
Air-compressing machinery	18,838	37,289	293,863	284,889
Brewers' machinery	23,071	1,284	162,858	53,940
Cash registers	10,651	81,488	2,802,671	864,884
Parts of	8,490	7,748	36,622	70,735
Cotton gins	409	10,592	93,481	40,082
Cream separators	19,556	36,079	257,373	192,949
Elevator and elevator machinery	71,840	85,379	794,056	553,511
Electric locomotives	49,121	61,739	505,013	195,977
Gas engines, stationary	16,946	18,721	237,292	335,482
Gasoline engines	198,178	450,622	3,974,250	3,532,017
Steam engines	430,156	569,559	2,785,549	2,502,972
All other engines	55,046	154,881	513,719	712,672
Parts of	*234,621	431,845	1,943,559	2,795,710
Laundry machinery, power	22,580	23,712	293,327	215,945
All other	8,349	23,023	381,841	159,509
Lawn mowers	10,722	16,055	339,095	246,754
Metal-working machinery (including metal-working tools)	298,259	3,624,411	7,877,375	27,587,226
Meters, gas and water	26,026	22,936	69,021	180,015
Milling machinery (flour and grist)	28,621	168,133	646,033	1,491,167
Mining machinery			*3,928,631	
Oil-well machinery	326,184	151,721	†614,118	933,570
All other	218,701	501,147	†724,317	3,425,675
Paper-mill machinery	49,673	63,564	417,869	584,196
Printing presses	93,468	85,945	1,532,629	975,391
Pumps and pumping machinery	181,064	324,617	2,180,423	1,906,309
Refrigerating and ice-making machinery	58,366	106,866	451,811	605,602
Sewing machines	304,866	381,192	6,707,035	4,064,943
Shoe machinery	56,025	129,334	778,958	1,000,108
Sugar-mill machinery	123,238	646,120	809,250	1,773,126
Textile machinery	69,147	183,775	862,307	1,203,499
Typesetting machines	152,651	58,043	1,372,448	294,245
Typewriting machines	192,125	637,023	6,525,368	4,616,295
Windmills	69,253	73,066	883,420	564,011
Woodworking machinery, saw mill	25,456	33,209	401,263	245,262
All other	46,393	97,981	697,752	544,374
All other machinery, and parts of	1,233,062	2,094,702	13,342,880	14,329,351
Total	$4,759,663	11,439,291	67,322,446	79,396,113

*Figures are for six months, January to June inclusive.
†Figures cover period since June 30.

It will be observed that the general classification "mining machinery" in this table was abandoned July 1, 1914, since which date "oil-well machinery" and "all other mining machinery" have been separately reported.

W. L. C.

ESTABLISHED 1855

THE IRON AGE

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For Larger Use of Bessemer Steel

Repeatedly in reviews of the steel market it has been said that the enormous orders for open-hearth steel, both in export and domestic trade, have tended to create a steel famine, while at the same time a very considerable capacity in Bessemer converters lay idle. Enough has been said about the reasons for this—the well-nigh exclusive preference of the railroads for open-hearth rails, the need of soft low phosphorus steel for certain forms of service, the fact that Bessemer steel would not meet the requirements for the shells which Europe has been ordering in hundreds of thousands of tons, and so on. It has amounted to little, apparently, simply to point out in this way the drift toward a very tight situation in open-hearth steel. What is needed is some practical effort on the part of steel makers and steel users to make Bessemer steel answer, as it can very well do, in a good many places into which open-hearth steel is now regularly going.

In part the habit of calling for open-hearth steel exclusively, by a good many dealers, is due to the greater convenience of having to carry but one kind of stock. There are uses in which Bessemer bars will serve as well as open-hearth. Bessemer sheets for stove pipe and for oil and gas stoves could be substituted for open-hearth, as could Bessemer steel in certain light stack and tank work and in the tin plate field, as well as in wire and tubular products where the Bessemer converter once found its outlet so largely. Some forms of light structural work also could as well employ Bessemer as open-hearth steel.

The situation is that heavy additional sales of large open-hearth rounds and squares for munition purposes could be made for Europe just now if domestic users and makers of steel would co-operate in seeing that Bessemer steel is used at home where open-hearth steel is now needlessly called for. The large self-contained steel interests, having both Bessemer and non-Bessemer ores, would have no difficulty in adjusting their furnace output, within certain limits, for a larger converter operation, since basic iron could be bought in the open market. At Pittsburgh, Youngstown, Columbus and South Chicago is Bessemer capacity which could be turned to account. It is true that rolling mill capacity and not melting capacity imposes the limitation in some cases, but by no means in all.

Highly profitable export business has been turned away which might have been taken, under a better adjustment of domestic demand, and home consumers have paid $1 to $2 a ton more for steel than would have been asked under a Bessemer specification. The problem is thus a practical one in conservation.

Cancellation on War Steel

Some of the contracts for war steel placed with producers in the United States are absolute, the delivery period being six months or less. In some cases, also, contracts for longer deliveries have been accompanied by guaranties against cancellation, and the manufacturers who have undertaken the making of shrapnel from such steel have received advances from the foreign buyers sufficient to cover all investments made in new plant and equipment. On an important purchase of large rounds recently made in the Central West deliveries are to extend from the present month through 1916 and the first half of 1917. The mill has an ironclad contract for half of the steel, but the other half is subject to cancellation should the war terminate before it is filled. Similar provisions are incorporated in the original shell contract taken by a large eastern Pennsylvania interest, which in turn sublet to various plants throughout the country. Recent developments in Europe, however, have caused the steel trade and the entire metal-working industry to attach less importance to this question of cancellation. What seems assured is that the present long-term contracts will be followed by yet others and that there need be no borrowing of trouble over guaranties meanwhile.

The Machinists' Shorter Day

It is unfortunate that the struggle of the machinists and other metal workers for a shorter day without reduction of pay is so definitely connected in many cases with efforts for union organization and domination. For several months New England, as the great center of war-order activity in metal-working lines, has been the storm center of labor demands. It is worthy of note that wherever the machinists have not demanded union recognition or have withdrawn that demand the majority of manufacturers have granted concessions

satisfactory to their employees. The issue is being most sharply fought in the cities where the manufacturers are most strongly organized. To these cities some of the most aggressive and persuasive organizers have been sent. Under their direction the work of organization and the demand for union recognition have been so diligently pushed that the issue of unionism has almost obscured the original eight-hour movement.

The newspapers in these cities have been full of charges and countercharges. Statements, generally exaggerated, of the number of machinists leaving particular cities to work elsewhere have excited profound public interest. In almost every industrial center one or more large concerns have voluntarily granted the forty-eight-hour week. In many cases where strikes have been prolonged State and city officials and citizens' committees have been active as mediators, often successfully. It is mostly in cities where the National Metal Trades Association is strong that the manufacturers are apparently winning without granting concessions, either in pay, hours or working conditions. This does not imply that conditions or wages in these cities compare unfavorably with conditions and wages in cities where the manufacturers' associations are not part of a national body, for such is not the case.

Where employers are sternly and steadfastly refusing the demands made upon them by their employees it is squarely upon the issue of the right of the employer to deal with his men as individuals, not as parts of an organization officered and controlled outside of his working force. Recognizing that the issue is the "closed shop," not the eight-hour day, such employers find no room for compromise. Many a manufacturer thus finds himself forced into refusing demands to which, under other circumstances, both reason and sentiment would incline him to give favorable consideration.

Perhaps no industrial problem of late years has brought forth such divergent opinions among manufacturers as the present eight-hour movement in New England. Many conservative employers see great evils attendant upon the general acceptance of the shorter day. Production costs will go up; plants must be enlarged and equipment added in order to maintain output; foreign competition at lower labor costs will destroy the American machine-tool business; drunkenness and crime will increase; thrift will decline—these and other harmful results are prophesied.

On the other hand are manufacturers who accept none of the conclusions of such reasoning. One who has granted the eight-hour day says: "This will not be anywhere near the wrench that was felt when we went to nine hours in 1901 and 1902. If the manufacturers are willing to assume their share of the burden, to standardize upon the fewest possible products and to bend every energy to improve tools and manufacturing processes, there is no good reason why unit production costs should go up under the shorter working schedule. We are satisfied that by careful and constructive planning we can keep costs at the present level and possibly reduce them."

Among the large majority of employers in the metal-working trades is the feeling that the unparalleled situation which has made victory in Europe turn not only upon sheer tonnage in steel projectiles, but upon the metal-cutting capacity of American machine tools, must not be allowed to settle for years to come so important an issue as the eight-hour machine-shop day. Just before this remarkable war demand burst upon the country the machinery trade had been depressed and unprofitable for many months. What will be its condition when Europe is again at peace none can certainly predict. Therefore, it is argued, and with reason, that any readjustments now made that raise the unit cost of product must be made in the full expectation of other adjustments in turn that will lower the unit cost of product when American machinery manufacturers must again meet their European competitors on even terms.

Surprising Pig-Iron Capacity

A fortnight ago we discussed the perennial subject of the country's effective blast-furnace capacity, basing an estimate of the capacity upon the productive rate shown for Sept. 1 and upon the furnaces then idle which were in operation in February, 1913, when pig-iron production reached a rate which has not been touched until recent weeks. Our blast-furnace report for September, published last week, furnishes more proof that our effective capacity is decidedly greater than has been generally assumed.

The argument of a fortnight ago was that on Sept. 1 last the production of coke and anthracite pig iron was at the rate of 91,075 tons daily, which, with an allowance for charcoal iron, indicated an annual rate for all pig iron of 33,500,000 tons, and that there were then idle sixty-six furnaces, with 13,800 tons daily capacity, or 5,000,000 tons annual capacity, which had been active in February, 1913. This pointed to a present capacity of 38,500,000 tons, subject to the possibilities of ore, coke and labor being available to permit the resumption of the idle furnaces.

Our blast-furnace report for September, published later, shows that twenty furnaces were blown in in September, while only one was blown out. Of the twenty blown in, sixteen were of those included in the previous computation, leaving still idle, of that list, fifty furnaces with 10,000 tons daily capacity. The active capacity shown by the later report for Oct. 1 was equivalent, with an allowance for charcoal pig, to an annual rate of 35,850,000 tons, while adding 3,650,000 tons for the fifty furnaces left idle makes a total of 39,500,000 tons. It is assuming very little indeed to take it that there are furnaces not included in either the category of those active at the beginning of this month, or active in February, 1913, that can produce 500,000 tons a year, whereupon we have apparently 40,000,000 tons of available capacity, subject to the important question whether the furnaces could continuously make pig iron at this rate. As is well known, the output of a furnace varies with conditions, and particularly the weather, the changes in humidity from season to season producing very material fluctuations. As a rule outputs are light in July and August, and exceptionally heavy in such months as October and March.

In order to secure more accurate information on the matter as pertains to the present discussion than has been generally available, a study of THE

IRON AGE reports in past years has been made. Selecting the period 1905 and 1906, twenty-four months, as one in which the number of furnaces in blast changed very little from month to month, we find, in average outputs per furnace for the month, a very irregular record: January high, February low, March still higher, July very low, October extremely high, February low, March and April very high, August extremely low and November very high. From October, 1912, to October, 1913, there was a similar period of relatively full activity, and a scrutiny of outputs per furnace shows: October very high, March low on account of temporary stoppages from floods, May high, July very low, August fully up to the average and October extremely high.

The indication clearly is that it may be considered normal for a month of exceptionally poor conditions to show an output 5 per cent below the average for a twelvemonth and a month of exceptionally good conditions to show an output 5 per cent above the average, also that if the divergence in what is a poor or a good month is only say 3 per cent from the average, then the month is exceptional in not experiencing the extreme weather condition that usually obtains in that month.

The weather last August was much better, from the blast-furnace standpoint, than it usually is in that month. The weather in September was hardly as good, and it certainly did not approach in quality the ideal weather that has made October famous for blast-furnace records. The reported capacities per furnace average as follows: August 1, 234 furnaces, 371 tons per furnace; Sept. 1, 249 furnaces, 366 tons; Oct. 1, 268 furnaces, 364 tons. The actual outputs per furnace, assuming the number in blast to have been the mean between the number in blast at the beginning and the number in blast at the close of the month, were 371 tons per furnace in August and 369 tons per furnace in September, or a scarcely perceptible amount above the ratings.

In a 35,000,000 tons industry a divergence of 5 per cent either way in the rate of production in a month means no less than 1,750,000 tons, certainly an important item, and if an August with poor weather conditions showed production at 35,000,000 tons, an October with good weather conditions could show 38,500,000 tons, while a twelvemonth could show 36,750,000 tons. Considering weather conditions as they actually prevailed in the past two months, it would appear that they were practically representative, as to tonnage, of a full year's experience, hence there is little if any deduction to be made from the 40,000,000-ton estimate of total capacity, on the ground that it was based upon blast-furnace performance during exceptionally favorable weather. Neither is it to be assumed that with average weather conditions the furnaces could do better.

Comparison of outputs per blast furnace brings out a fact which has not been generally rated at its full value, that blast-furnace outputs have been increasing markedly and in greater ratio than would be expected from the fact that a relatively small number of blast furnaces have been rebuilt or otherwise improved. We find the furnaces producing an average of 370 tons a day in August and September, against 232 to 248 tons in 1912-13 and 209 to 234 tons in 1905-6. These gains were not all made by the building of new and large furnaces and by rebuilding and enlarging old furnaces. Some of them are due to better practice. This fact goes far in explaining how it is that present returns suggest that we may have a blast-furnace capacity of about 40,000,000 tons annually when estimates made not so long ago, and depending upon the performances of 1912 and 1913, placed the capacity at considerably lower figures.

While the furnaces now in blast and those idle could apparently produce about 40,000,000 tons of pig iron if they remained in blast a year, it does not follow that they can all stay in blast a year. There must be stoppages for relining and other repairs. In periods of heavy demand, however, relining is done quickly, and it is safe to estimate that in a period of years, beginning now, the time out for relining would not constitute as much as 5 per cent of the total time, which would mean a deduction of less than 2,000,000 tons from the 40,000,000 tons. A few new furnaces will come in before many must go out, and that will help to make up for losses in output through relining.

Large Increase in Steel Corporation Orders

The statement of the Steel Corporation's unfilled orders as of Sept. 30 shows a total of 5,317,618 tons, as compared with 4,908,455 tons on Aug. 31. This is an increase of 409,163 tons, considerably more than had been forecasted by the trade. The total on the books is the largest since July 31, 1913, when it was 5,399,356 tons. On Sept. 30, 1914, the tonnage was only 3,787,667 tons. The following table shows the unfilled tonnage for each month, beginning with the high point of Dec. 31, 1912:

Sept. 30, 1915	5,317,618	April 30, 1914	4,277,068
Aug. 31, 1915	4,908,455	March 31, 1914	4,653,825
July 31, 1915	4,928,540	Feb. 28, 1914	5,026,440
June 30, 1915	4,678,196	Jan. 31, 1914	4,613,680
May 31, 1915	4,264,598	Dec. 31, 1913	4,282,108
April 30, 1915	4,162,244	Nov. 30, 1913	4,396,347
March 31, 1915	4,255,749	Oct. 31, 1913	4,513,767
Feb. 28, 1915	4,345,374	Sept. 30, 1913	5,003,795
Jan. 31, 1915	4,248,571	Aug. 31, 1913	5,223,463
Dec. 31, 1914	3,836,643	July 31, 1913	5,399,356
Nov. 30, 1914	3,324,592	June 30, 1913	5,807,217
Oct. 31, 1914	3,461,097	May 31, 1913	6,324,322
Sept. 30, 1914	3,787,667	April 30, 1913	6,978,762
Aug. 31, 1914	4,213,331	March 31, 1913	7,468,958
July 31, 1914	4,158,589	Feb. 28, 1913	7,656,714
June 30, 1914	4,032,857	Jan. 31, 1913	7,827,368
May 31, 1914	3,998,160	Dec. 31, 1912	7,932,164

Youngstown Plants Break Records

All records for output of steel at the Ohio works of the Carnegie Steel Company, Youngstown, Ohio, were broken in September. The open-hearth furnaces produced 56,000 tons of ingots, an average of 2155 tons per day, the plant not being operated on Sundays. The Bessemer plant turned out about 61,000 tons of ingots. The 43-in. blooming mill turned out 70,200 tons and the 40-in. mill 25,300 tons, the total for the month of both mills being 95,500 tons. The six blast furnaces at this plant also made a notable record in September. The company's Upper and Lower mills, also in Youngstown, made notable records of output in September. Its Greenville works, Greenville, Pa., turned out more steel in September than in any previous month.

There has been no definite development in the negotiation for the sale of the New York State Steel Company plant at Buffalo by the committee representing the bondholders. It is considered too late now, however, to get down Lake Superior ore for winter operation of the blast furnace, the high grain rates preventing ore shippers from obtaining boats for ore not covered by charters.

The Charcoal Iron Company of America, Detroit, Mich., will blow in its Manistique furnace, Manistique, Mich., this month, following an extended idleness, during which the plant has been rehabilitated.

AUSTRALIA ANTI-DUMPING LAW

It Will Be a Pattern at Washington Rather Than the Canadian Statute

WASHINGTON, D. C., Oct. 12, 1915.—Since the first publication of Secretary Redfield's plan for recommending anti-dumping legislation in his forthcoming annual report, leading members of the Ways and Means and Finance committees have visited Washington. Whatever they may have said to the President and members of his Cabinet regarding the proposed legislation, it can be stated very positively that, in conversation with other officials and with representatives of the press, they have deprecated strongly the agitation of the general subject of the amendment of the tariff law. They have especially expressed their opposition to any changes designed to increase rates for any purpose.

Secretary Redfield's present plan for securing the passage of a law to prevent dumping without in any way disturbing the Underwood-Simmons tariff act is set forth rather inferentially in two official statements which have just been made public by Dr. E. E. Pratt, chief of the Bureau of Foreign and Domestic Commerce, one of them being in the form of a brief letter addressed to Dr. Pratt. In it the Secretary says he is considering the methods used in different countries to prevent dumping, "with a frank preference for such as have nothing to do with tariffs or duties." In an additional statement he makes it clear that he has decided not to suggest to Congress the enactment of an anti-dumping clause modeled on the Canadian law, as it has been assumed he would do, but to pass an act embodying, possibly with certain modifications, the principal features of the Australian law which, together with the anti-dumping provision of the latest tariff act of the Union of South Africa and the Canadian law, make up the body of statutes of this character now in force.

The Australian Government in 1906 enacted legislation against dumping under the general characterization of a prohibition against "unfair competition." It deems competition unfair, unless the contrary is proved, if—

(a) Under ordinary circumstances of trade it would probably lead to the Australian goods being no longer produced or being withdrawn from the market or being sold at a loss unless produced at an inadequate remuneration for labor; or

(b) The means adopted by the person importing or selling the imported goods are, in the opinion of the comptroller-general or a justice, as the case may be, unfair in the circumstances; or

(c) The competition would probably or does in fact result in an inadequate remuneration for labor in the Australian industry; or

(d) The competition would probably or does in fact result in creating any substantial disorganization in Australian industry or throwing workers out of employment; or

(e) The imported goods have been purchased abroad by or for the importer, from the manufacturer or some person acting for or in combination with him or accounting to him, at prices greatly below their ordinary cost of production where produced or market price where purchased; or

(f) The imported goods are imported by or for the manufacturer, or some person acting for or in combination with him or accounting to him, and are being sold in Australia at a price which is less than gives the person importing or selling them a fair profit upon their fair foreign market value, or their fair selling value if sold in the country of production, together with all charges after shipment from the place whence the goods are exported directly to Australia (including customs duty).

The processes and the machinery employed or adopted in the Australian industry affected by the competition are required to be reasonably efficient and up to date. The comptroller-general, whenever he has received a complaint in writing, may certify to the government that the imports in question are intended to injure or destroy Australian industry. The government may then refer to a justice the determination of the question whether the imported goods are being imported with the intent alleged, and, if so, whether the importation of the goods should be prohibited, either absolutely or subject to any specified conditions or restrictions or limitations. There is no appeal from the finding.

In commenting upon the Australian law, which obviously is to be used as the basis of Secretary Redfield's recommendation to Congress, a statement prepared by the Bureau of Foreign and Domestic Commerce points out that "while the Canadian and South African anti-dumping provisions are part of the customs laws, the special or anti-dumping duties are to be considered not as ordinary customs duties, but rather as penalties to prevent unfair competition with industries within the two dominions."

It is to be hoped that, if the Australian act is taken as a model, an expeditious and simple administrative code will be adopted by Congress for its enforcement. While the Bureau of Foreign and Domestic Commerce does not call attention to the fact, it is a matter of record that the Australian law has but rarely been invoked, a fact which may be attributed to the comparatively unimportant development of manufacturing industries in the Commonwealth.

W. L. C.

The National Association of Waste Material Dealers will hold a special meeting at the Hotel Astor, New York, on Wednesday, Oct. 20, at 2 p. m. The Metal Division of the association will meet on the previous day at the same place at 2 p. m., and it is expected that matters of importance will be discussed.

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The Iron and Metal Markets

THE SCARCITY OF STEEL

Still the Dominating Market Factor

Higher Prices Looked for, yet No Precipitate Buying for Next Year—New Export Records

The volume of current business for 1916 delivery is not as great as might be expected with steel as scarce as it is and with the expectation general that this tightness will continue for months. Few mills are making any effort to sell for any part of next year, but the Steel Corporation's gain of 400,000 tons in unfilled orders is taken to mean that it has done more selling for the first half than its competitors.

Some of the steel companies are holding off because they are well sold up for several months and look for higher prices; others are making sales at 1.40c., Pittsburgh, for heavy products and prefer that the advance should not be rapid. One large Central Western producer is asking 1.50c. for bars and plates for the first quarter.

Apparently buyers for European governments have failed to appreciate the rate at which the mills have been filling up. France has held back large requirements for the first half of next year which must soon be placed. Italy has been asking for barb wire, plates, billets and bars running up to 100,000 tons and has encountered rising prices on all sides.

The railroads moved none too quickly in placing rails for next year. At Chicago, where railroad buying has been the feature, some mills now have much more than a backlog for the first half. Additions to the first B. & O. contracts have brought the total to 62,500 tons, chiefly 100-lb. rails.

Manufacturers of light rails announced this week an advance of $2 per gross ton, or from 1.25c. to 1.34c. for 25-lb. to 45-lb. sections.

At Pittsburgh 40,000 to 50,000 tons of car material has just been ordered, apart from a 9000-ton requirement for Norfolk & Western steel gondolas. The large amount of vessel work coming forward in the East has done much to stiffen the plate market.

With some structural mills nearly filled for several months, it is not surprising that 1.40c., Pittsburgh, is nominal or that 1.50c. is asked on new business. Fabricating shops took contracts in September equal to 67 per cent of capacity, compared with 85 per cent in August, bringing the average for this year close up to that for 1912, which passed for a good year.

Fabricators already find trouble in getting protection by options from the mills for work in prospect, since higher levels are looked for. Yet the low bid on 60,000 tons for the Brooklyn Rapid Transit system averaged only $44.60 a ton for fabricated material delivered in Brooklyn, or $11.50 a ton below the nearest bid. Figured on $28 steel, these bids mean $16.60 and $28.10 respectively for fabrication, haulage and profit.

Tin-plate contracts for next year are still in abeyance. Salmon canners have bought at $3.25, Pittsburgh, for first quarter, but for the full year $3.40 and $3.50 are considered more likely. While nominally $3.25, this year's contracts ranged all the way down to $3.

Blue annealed and automobile sheets are the main props of the sheet trade. The galvanized product shows less than a 25 per cent movement, the gyrations of spelter destroying all reckoning.

With all the congestion in open-hearth steel bars, for which as high as 1.50c. has been paid, bar-iron mills in the Chicago district can scarcely keep running and users are not availing themselves of the cheaper Bessemer bars. In the Eastern market bar iron for early delivery has advanced $1 a ton.

All sorts of premiums have been paid for steel billets, the export trade in particular showing wide variations in price. Of interest to the sheet trade is the price of $26, Youngstown, brought out by a sheet-bar inquiry for the first quarter of next year.

Exports in August made the unprecedented record of 401,000 tons for iron and steel products reported in tons, or at nearly 5,000,000 tons a year. Machinery and munitions and other exports consisting largely of steel bring the rate close up to 7,500,000 tons a year.

Pig-iron markets are strong even though merchant output is increasing with each month. There is enough lag in the foundry industry to make buyers cautious, and in some localities strikes in machine shops have reduced the demand for castings.

In steel-making pig iron fresh inquiries have come out in several markets—for 10,000 tons of Bessemer and 15,000 tons of basic at Pittsburgh, a round lot of basic at Chicago, and 5000 tons at St. Louis, where one sale of 10,000 tons was made this week.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month and one year previous

	Oct. 13, 1915.	Oct. 6, 1915.	Sept. 15, 1915.	Oct. 14, 1914.
Pig Iron, Per Gross Ton:				
No. 2 X, Philadelphia	$16.25	$16.25	$16.00	$14.75
No. 2, Valley furnace	14.75	14.75	14.50	12.60
No. 2 Southern, Cin'ti	14.40	14.40	14.15	12.90
No. 2, Birmingham, Ala.	11.50	11.50	11.25	10.00
No. 2, furnace, Chicago*	14.25	14.25	14.00	13.00
Basic, del'd, eastern Pa.	17.00	17.00	17.00	14.00
Basic, Valley furnace	15.00	15.00	14.75	13.00
Bessemer, Pittsburgh	16.95	16.95	16.95	14.90
Malleable Bess., Ch'go*	15.00	15.00	14.50	13.00
Gray forge, Pittsburgh	14.70	14.70	14.70	13.65
L. S. charcoal, Chicago	15.75	15.75	15.75	15.75
Billets, etc. Per Gross Ton:				
Bess. billets, Pittsburgh	24.50	24.50	24.00	20.00
O.-h. billets, Pittsburgh	25.00	25.00	24.50	20.00
O.-h. sheet bars, P'gh	25.50	25.50	25.50	20.50
Forging billets, base, P'gh.	**34.00**	**33.00**	32.00	25.00
O.-h. billets, Phila	30.00	30.00	30.00	22.50
Wire rods, Pittsburgh	31.00	31.00	30.00	26.00
Finished Iron and Steel, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy, at mill	1.25	1.25	1.25	1.25
Iron bars, Philadelphia	**1.559**	1.509	1.459	1.12
Iron bars, Pittsburgh	1.40	1.40	1.35	1.15
Iron bars, Chicago	1.35	1.35	1.25	1.00
Steel bars, Pittsburgh	1.40	1.40	1.35	1.15
Steel bars, New York	1.569	1.569	1.519	1.31
Tank plates, Pittsburgh	1.40	1.40	1.35	1.15
Tank plates, New York	1.569	1.569	1.519	1.31
Beams, etc., Pittsburgh	1.40	1.40	1.35	1.15
Beams, etc., New York	1.569	1.569	1.519	1.31
Skelp, grooved steel, P'gh	1.40	1.40	1.30	1.15
Skelp, sheared steel, P'gh	1.45	1.45	1.35	1.20
Steel hoops, Pittsburgh	**1.50**	1.40	1.35	1.25

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire,	Oct. 13, 1915.	Oct. 6, 1915.	Sept. 15, 1915.	Oct. 14, 1914.
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh	2.00	2.00	1.90	1.95
Galv. sheets, No. 28, P'gh	3.50	3.50	3.60	2.95
Wire nails, Pittsburgh	1.75	1.75	1.65	1.60
Cut nails, Pittsburgh	1.70	1.70	1.60	1.60
Fence wire, base, P'gh	1.60	1.60	1.50	1.40
Barb wire, galv., P'gh	2.60	2.60	2.50	2.00
Old Material, Per Gross Ton:				
Iron rails, Chicago	$13.50	$13.50	$13.50	$11.25
Iron rails, Philadelphia	18.50	18.50	18.50	14.00
Carwheels, Chicago	12.00	12.00	11.75	10.75
Carwheels, Philadelphia	14.00	14.00	14.00	10.50
Heavy steel scrap, P'gh	14.00	14.00	14.50	11.00
Heavy steel scrap, Phila.	15.00	15.00	15.00	10.00
Heavy steel scrap, Ch'go	11.75	11.75	11.75	8.50
No. 1 cast, Pittsburgh	13.00	13.00	13.00	11.50
No. 1 cast, Philadelphia	14.00	14.00	14.00	11.50
No. 1 cast, Ch'go (net ton)	10.50	10.50	10.00	9.00
Coke, Connellsville,				
Per Net Ton at Oven:				
Furnace coke, prompt	$1.85	$1.75	$1.60	$1.60
Furnace coke, future	2.25	2.25	2.00	1.75
Foundry coke, prompt	2.25	2.15	2.45	2.00
Foundry coke, future	2.50	2.50	2.40	2.15
Metals,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	18.00	18.00	18.00	12.00
Electrolytic copper, N. Y.	18.00	18.00	17.75	11.37½
Spelter, St. Louis	13.00	14.00	13.75	4.65
Spelter, New York	13.25	14.25	14.00	4.80
Lead, St. Louis	4.42½	4.42½	4.35	3.35
Lead, New York	4.50	4.50	4.50	3.50
Tin, New York	32.75	32.00	33.37½	29.75
Antimony, Asiatic, N. Y.	28.50	28.00	27.50	11.00
Tin plate, 100-lb. box, P'gh.	$3.15	$3.15	$3.15	$3.25

Finished Iron and Steel f. o. b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 73.9c. on plates, structural shapes and sheets and 65c. on wrought pipe and boiler tubes. The foregoing rates to the Pacific coast are by rail. The rate via New York and the Panama Canal is 56.9c.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.40c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated Feb. 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft. down to the weight of 3-16 in. take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gage or weight to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras	Cents per lb.
Gages under ¼ in. to and including 3-16 in.	.10
Gages under 3-16 in. to and including No. 8	.15
Gages under No. 8 to and including No. 9	.25
Gages under No. 9 to and including No. 10	.30
Gages under No. 10 to and including No. 12	.40
Sketches (including straight taper plates), 3 ft. and over	.10
Complete circles, 3 ft. in diameter and over	.20
Boiler and flange steel	.10
"A. B. M. A." and ordinary firebox steel	.20
Still bottom steel	.30
Marine steel	.40
Locomotive firebox steel	.50
Widths over 100 in. up to 110 in., inclusive	.05
Widths over 110 in. up to 115 in., inclusive	.10
Widths over 115 in. up to 120 in., inclusive	.15
Widths over 120 in. up to 125 in., inclusive	.25
Widths over 125 in. up to 130 in., inclusive	.50
Widths over 130 in.	1.00
Cutting to lengths under 3 ft. to 2 ft., inclusive	.25
Cutting to lengths under 2 ft. to 1 ft., inclusive	.50
Cutting to lengths under 1 ft.	1.55

No charge for cutting rectangular plates to lengths 3 ft. and over.

Wire Products.—Prices to jobbers: Fence wire, Nos. 0 to 9, per 100 lb., terms sixty days or 2 per cent discount in ten days, carload lots, annealed, $1.60; galvanized, $2.30. Galvanized barb wire and staples, $2.60; painted, $1.90. Wire nails, $1.75. Galvanized nails, 1 in. and longer, $1.75 advance over base price; shorter than 1 in., $2.25 advance over base price. Woven wire fencing, 69½ per cent off list for carloads, 68½ off for 1000-rod lots, 67½ off for less than 1000-rod lots.

The following table gives the price per 100 lb. to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	0 to 9	10	11	12&12½	13	14	15	16
Annealed	$1.65	$1.70	$1.75	$1.80	$1.90	$2.00	$2.10	$2.20
Galvanized	2.55	2.60	2.65	2.70	2.80	2.90	3.20	3.30

Wire Rods.—Bessemer, open-hearth and chain rods, $31 to $32.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 1.40c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in., on one or both legs	.10
Angles, 3 in. on one or both legs less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to 80
Deck beams and bulb angles	.30
Handrail tees	.75
Cutting to lengths under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting to lengths 3 ft. and over.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect from Aug. 16, 1915, all full weight:

Butt Weld

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
⅛, ¼ and ⅜	72	46½	⅛ and ¼	64	37
½	76	59½	⅜	64	37
¾ to 3	79	63½	½	68	47
			¾ to 2½	71	52

Lap Weld

2	76	60½	1¼	55	36
2½ to 6	78	62½	1½	66	47
7 to 12	76	58½	2	67	49
13 and 14	62½	..	2½ to 4	69	52
15	60	..	4½ to 6	69	52
			7 to 12	67	50

Reamed and Drifted

1 to 3, butt	77	61½	1 to 1½, butt	69	50
2, lap	74	58½	2, butt	69	50
2½ to 6, lap	76	60½	1¼, lap	53	34
			1½, lap	64	45
			2, lap	35	47
			2½ to 4, lap	67	50

Butt Weld, extra strong, plain ends

⅛, ¼ and ⅜	67	49½	⅜	61	43
½	72	58½	½	66	51
¾ to 1½	76	62½	¾ to 1½	70	53
2 to 3	77	63½	2 and 2½	71	54

Lap Weld, extra strong, plain ends

2	73	57½	1½	65	48
2½ to 4	75	59½	2	67	49
4½ to 6	74	58½	2½ to 4	69	52
7 to 8	68	50½	4½ to 6	68	51
9 to 12	63	45½	7 to 8	61	44
			9 to 12	56	39

Butt Weld, double extra strong, plain ends

½	62	48½	½	56	40
¾ to 1½	65	51½	¾ to 1½	59	43
2 to 2½	67	53½	2 and 2½	61	45

Lap Weld, double extra strong, plain ends

2	63	49½	2	57	40
2½ to 4	65	51½	2½ to 4	59	45
4½ to 6	64	50½	4½ to 6	58	44
7 to 8	58	40½	7 to 8	51	53

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts on less than carloads, f.o.b. Pittsburgh, freight to destination added, on lap welded steel tubes and standard charcoal iron tubes, effective from Oct. 1, 1915, are as follows:

Lap Welded Steel		*Standard Charcoal Iron*	
1½ in.	50	1½ in.	45
1¾ and 2 in.	62	1¾ and 2 in.	49
2¼ in.	59	2¼ in.	46
2½ and 2¾ in.	65	2½ and 2¾ in.	53
3 and 3½ in.	70	3 and 3½ in.	57
3½ to 4½ in.	71	3½ to 4½ in.	59
5 and 6 in.	64	5 and 5 in.	53
7 to 13 in.	61		

Locomotive and steamship special charcoal grades bring higher prices.

1¾ in., over 18 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Sheets.—Makers' prices for mill shipment on sheets of U. S. Standard gage, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f.o.b. Pittsburgh, terms thirty days net, or 2 per cent cash discount in ten days from date of invoice:

Blue Annealed Sheets

	Cents per lb.
Nos. 3 to 8	1.55
Nos. 9 to 10	1.60
Nos. 11 and 12	1.65
Nos. 13 and 14	1.70
Nos. 15 and 16	1.80

Box Annealed Sheets, Cold Rolled

	Cents per lb.
Nos. 10 and 11	1.65 to 1.75
No. 12	1.65 to 1.75
Nos. 13 and 14	1.70 to 1.80
Nos. 15 and 16	1.75 to 1.85
Nos. 17 to 21	1.80 to 1.90
Nos. 22 and 24	1.85 to 1.95
Nos. 25 and 26	1.90 to 2.00
No. 27	1.95 to 2.05
No 28	2.00 to 2.10
No. 29	2.05 to 2.15
No. 30	2.15 to 2.25

Galvanized Sheets of Black Sheet Gage

	Cents per lb.
Nos. 10 and 11	2.50 to 2.65
No. 12	2.60 to 2.75
Nos. 13 and 14	2.60 to 2.75
Nos. 15 and 16	2.70 to 2.85
Nos. 17 to 21	2.85 to 3.00
Nos. 22 and 24	3.05 to 3.20
Nos. 25 and 26	3.20 to 3.35
No. 27	3.35 to 3.50
No. 28	3.50 to 3.65
No. 29	3.65 to 3.75

Pittsburgh

PITTSBURGH, PA., Oct. 12, 1915.

The large steel companies report that actual orders on their books now are much the heaviest than in any one time for more than two years. All mills are running to their utmost capacity. Consumers being covered on their needs for the remainder of this year, and the mills sold up for the same period, attention naturally turns to first quarter and first half of 1916. Consumers are anxious to cover for these deliveries as soon as possible in anticipation of a higher market. Some heavy contracts for plates, shapes and bars have been placed with local mills for first quarter and first half at 1.40c., and in a few cases at 1.45c., Pittsburgh. Steel manufacturers state that 1.40c. on the heavy hot rolled products, such as plates, shapes and bars, is a good price, fair to the buyer while affording a satisfactory margin of profit to the seller. They are not anxious to see prices advance too quickly or go too high, as there is always the danger of shutting off demand. Some heavy orders for rails have been placed the past week, with more in prospect. The local pig-iron market is dull, with prices fairly steady. There is an insistent heavy demand for billets and forging steel, for which high prices are being paid. Fabricating shops are getting filled with work and the demand is active. Sheets are better, with heavy sales of blue annealed at 1.60c. for first quarter. There have also been some large contracts for furnace coke. Scrap is dull, but with prices firm.

Pig Iron.—The smaller open-hearth steel companies and the foundries have not bought much iron for first quarter and first half of 1916, and just how soon they will come in the market is a question. A local foundry is in the market for 10,000 tons of Bessemer iron for delivery in first half. A local steel company is inquiring for 8000 to 10,000 tons of basic for first half, and an Ohio River steel interest for 5000 tons. A sale is reported of 500 tons of Bessemer for this year's delivery at $16, Valley furnace. A local interest has sent out inquiries for 8000 to 10,000 tons of Bessemer iron for first quarter and first half, and has been quoted as high as $16.50, Valley furnace. The Republic Iron & Steel Company has blown out one of its furnaces at Haselton for relining and repairs. Several merchant stacks are getting ready to go in blast, and Corrigan, McKinney & Co. will have one new stack ready about Jan. 1, and another about April 1, next year. Prices are fairly firm. We quote Standard Bessemer iron, $16; basic, $15; malleable Bessemer, $14.50 to $14.75; gray forge, $13.75 to $14, and No. 2 foundry, $14.75 to $15, all at Valley furnace, the freight for delivery in the Cleveland or Pittsburgh district being 95c. per ton.

Billets and Sheet Bars.—Most of the new steel inquiry is for forging billets for shrapnel purposes, and high prices are being paid. We note a sale of 160 tons of forging billets, ordinary carbons, at $34.50, delivered Pittsburgh. Consumers of sheet bars are covered by contracts, and specifications are active. Open-hearth billets continue very scarce and bring good prices. For delivery over remainder of the year we quote Bessemer billets, $24.50; open-hearth billets, $25; Bessemer sheet bars, $25, and open-hearth sheet bars, $25.50, maker's mill, Youngstown or Pittsburgh, prices of steel at the two points being practically the same. We quote forging billets at $34 to $34.50 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 and up to 0.60 carbon take $1 per ton extra. Axle billets are held at $29 to $30.

Ferroalloys.—A sale of 300 to 400 tons of English 80 per cent ferromanganese is noted at $100, Baltimore. Several cargoes are known to be on their way to this country, 2000 to 3000 tons being due to arrive this week. Consumers are still apprehensive about their supply, but so far there has been no serious embarrassment. Domestic 80 per cent is being offered at about $110 at furnace. We quote Bessemer ferrosilicon as follows: 10 per cent, $21; 11 per cent, $22; 12 per cent, $23; 13 per cent, $24.50; 14 per cent, $26.50; 15 per cent, $28.50, and 16 per cent, $31. These prices are f.o.b. furnace, Ashland, Ky., Jackson, Ohio, or New Straitsville, Ohio, each of these points having a freight rate of $2 per gross ton to Pittsburgh. These prices are for delivery over the remainder of this year only. For delivery in first quarter of 1916, 50c. per ton higher is quoted. We quote 20 per cent spiegeleisen at $27 at furnace; ferrotitanium at 8c. per pound in carloads, 10c. in 2000-lb. lots and over, and 12½c. in smaller lots; ferrovanadium, $2 to $2.25 per pound of contained vanadium, prices depending somewhat on the size of the order.

Steel Rails.—Some large rail contracts are being placed. It is reported that the Illinois Steel Company has taken 200,000 tons or more in the past two weeks. The Baltimore & Ohio has placed 22,500 tons, of which 6500 tons went to the Cambria Steel Company, and 16,500 tons to the Carnegie Steel Company. The Carnegie Company has also taken 5000 tons for the Pittsburgh & Lake Erie and 2500 tons for the Nickel Plate. The Erie Railroad has placed 20,000 tons, but the distribution of the order has not been announced. The new demand for light rails is active, the Carnegie Company having taken new orders and specifications the past week for close to 4500 tons. We quote standard section rails of Bessemer stock at 1.25c., and of open-hearth stock, 1.34c., f.o.b., Pittsburgh. We quote light rails $2 per ton higher, as follows: 25 to 45 lb. sections, 1.34c.; 16 and 20 lb., 1.39c.; 12 and 14 lb., 1.44c.; 8 and 10 lb., 1.49c., in carload or larger lots, 5c. per 100 lb. advance being charged for less than carload lots.

Structural Material.—Inquiry is heavy and indications are that the fabricating shops will soon be filled up for some months ahead. The Riter-Conley Mfg. Company has taken 2000 tons for extensions to steel buildings for the Broken Hill Proprietary Company, Newcastle, Australia; the American Bridge Company, 800 tons for an addition to the Hotel Statler, Detroit, Mich., and the McClintic-Marshall Company, 200 tons for a new steel building for the Pittsburgh Steel Products Company, Monessen, Pa. Bids have gone in on 600 tons for the new Tod House at Youngstown, Ohio. Prices are very strong. We quote beams and channels up to 15-in. at 1.40c., f.o.b. Pittsburgh, for delivery over remainder of this year.

Plates.—The Carnegie Steel Company has taken the past week 40,000 to 50,000 tons of car material and the Riter-Conley Mfg. Company about 3000 tons of oil tankage to be erected in the Oklahoma oil fields. There is a heavy demand for plates for first quarter and first half, and some orders have been placed with

the mills at 1.40c., Pittsburgh. We quote ¼-in. and heavier plates for remainder of this year and first quarter at 1.40c., Pittsburgh.

Carwheels.—The two local makers of steel wheels have their output sold up for the next three or four months and prices are very strong. We now quote 33-in. freight carwheels at $17; 33-in. tender wheels, $20; 36-in. passenger or tender wheels, $24. These prices are based on a 10-in. diameter hub, 50c. extra being charged for an 11-in. diameter hub, all f.o.b. Pittsburgh.

Sheets.—Several of the larger mills report orders for all the blue annealed and automobile sheets they can ship out in the next seven to eight weeks. The demand for Bessemer black is better, and some mills have four to five weeks' work ahead. Galvanized sheets are a little more active, but present demand is not more than 25 per cent of capacity. If the demand for galvanized sheets was normal, the sheet mills would not be able to turn out their product fast enough. This week the American Sheet & Tin Plate Company is operating to 79 per cent, and some of the other mills at a larger rate. Prices are firm, with indications of being higher in the near future on blue annealed and Bessemer black. We quote No. 28 galvanized sheets at 3.50c. to 3.65c.; No. 28 Bessemer black sheets, 2c.; Nos. 9 and 10 blue annealed, 1.60c.; No. 30 black plate, tin-mill sizes, H. R. & A., 1.95c.; No. 28, 1.90c.; Nos. 27, 26 and 25, 1.85c.; Nos. 22 and 24, 1.80c.; Nos. 17 to 21, 1.75c.; Nos. 15 and 16, 1.70c. The above prices are for carload lots, f.o.b. at maker's mill, jobbers charging the usual advance for small lots from store.

Tin Plate.—Specifications against contracts are fair. Indications are that consumers will take out every pound called for in their contracts for this year, knowing that for 1916 prices on tin plate are likely to be higher. Some consumers, notably the salmon packers, who wanted to contract for first quarter of 1916, have done so on the basis of $3.25 per base box, but for first quarter only. None of the tin-plate mills has yet fixed a price for all of 1916 delivery, but $3.40 to $3.50 is being mentioned. This week the American Sheet & Tin Plate Company is operating to 97 per cent of hot tin mill capacity, five days a week. Domestic demand is quiet, but prices are firm. We quote 14 x 20 coke plates for domestic trade at $3.15 to $3.25 per base box, f.o.b. Pittsburgh. There is some export inquiry, but it has quieted down.

Railroad Spikes.—Inquiry from the railroads for spikes for 1916 delivery is active, and there is some export demand. The Seaboard Air Line has placed 7000 to 8000 kegs with a Virginia maker. Local makers of spikes are holding firm for $1.60 for the remainder of this year, and $1.65 for first quarter. Small railroad and bolt spikes are $1.70 for prompt delivery, and $1.75 for first quarter per 100 lb.

Cold-Rolled Strip Steel.—Most consumers being covered for the remainder of this year and in some cases for first quarter of 1916, the new demand is only fair. There is some export demand. Makers of cold-rolled strip steel have more orders on their books now than at any time in probably two years. Premiums over the regular base price are being paid for prompt shipment. We quote hard-rolled steel, 1½ in. and wider, under 0.20 carbon, sheared or natural mill edge per 100 lb., $3.10 delivered. Extras, which are standard among all mills, are as follows:

Thickness, in.	Extras for thickness	Extras for soft or intermediate tempers	Extras for straightening and cutting to lengths not less than 24 in.
0.180 and heavier	Base	$0.25	$0.10
0.059 to 0.050	$0.05	0.25	0.15
0.049 to 0.035	0.20	0.25	0.15
0.034 to 0.031	0.35	0.40	0.25
0.030 to 0.025	0.45	0.40	0.40
0.024 to 0.020	0.55	0.40	0.50
0.019 to 0.017	0.85	0.50	1.10
0.016 to 0.015	1.25	0.50	1.10
0.014 to 0.013	1.95	0.50	1.25
0.012	2.30	0.50	coils only
0.011	2.65	0.50	coils only
0.010	3.00	0.50	coils only

Skelp.—While the new demand is dull, the mills that roll skelp ordinarily are now turning out other lines of product for which there is a heavier call. We quote grooved steel skelp at 1.40c. to 1.45c.; sheared steel skelp, 1.45c. to 1.50c.; grooved iron skelp, 1.80c. to 1.85c.; sheared iron skelp, 1.90c. to 1.95c., all delivered to consumers' mills in the Pittsburgh district.

Wire Rods.—While most consumers are covered on their needs for the remainder of the year, there is some domestic inquiry, while the export demand, notably from Canada, is quite heavy. Local wire mills say they are not selling rods, needing them all for their wire mills. One of the larger Pittsburgh mills has not taken any new orders for rods since last June, and another mill for more than three months. Prices are very firm. We quote Bessemer, open-hearth and chain rods at $31 to $32, f.o.b. Pittsburgh. For prompt shipment, $32 could likely be easily obtained.

Wire Products.—The wire mills are snowed under with business, both foreign and domestic, and are very conservative in taking on further obligations. In some cases, manufacturing consumers who wanted to contract for wire for six months ahead have done so and the price is to be adjusted in the latter part of each month for the following month. Wire mills will not sell for six months ahead at to-day's prices, but will take care of customers in the manner mentioned. The export demand for barb wire is heavy, one inquiry being in the market for 20,000 tons for England, and the party making the inquiry had 25 per cent of the price ready to put up as soon as the contract would be accepted. Most of the wire mills have their output sold up for the remainder of this year, and have taken some orders for first quarter. Prices are firm as follows: Wire nails, $1.75; galvanized nails 1 in. and longer taking an advance over this price of $1.75, and shorter than 1 in., $2.25. Plain annealed wire is $1.60; galvanized barb wire and fence staples, $2.60; painted barb wire, $1.90; polished fence staples, $1.90, all f.o.b. Pittsburgh, with freight added to point of delivery, terms sixty days net, less 2 per cent off for cash in ten days. Prices on woven wire fencing are 69½ per cent off list for carload lots, 68½ per cent for 1000-rod lots, and 67½ per cent for small lots, f.o.b. Pittsburgh.

Rivets.—Makers report that both domestic and export demand is heavy, and they are shipping their product as fast as made. The demand for boiler rivets is greater now than at any time in more than two years, and structural rivets are also active. We quote buttonhead structural rivets at $1.70 to $1.75, and conehead boiler rivets at $1.80 to $1.85, in carload lots, per 100 lb., f.o.b., Pittsburgh, smaller lots bringing about 10c. advance.

Hoops and Bands.—In some cases consumers of hoops that wanted to contract for six months or more ahead have done so without any flat prices having been named, the price to be fixed in the latter part of each month for the succeeding month. Makers of hoops will take care of their customers, but are not willing to sell for six months ahead at current prices. Hoops are now firm on the basis of 1.50c., and bands 1.40c., with extras on the latter as per the steel bar card.

Iron and Steel Bars.—The steel-bar mills are simply swamped with orders. and local makers report they have practically no bars to sell for delivery before first quarter of 1916. The new demand for steel rounds for shrapnel purposes is very heavy, inquiries now being out for 20,000, 30,000, 33,000 and 50,000 tons. It is not expected that much of this business, if it is placed, will come to local mills, as they are filled up so far ahead they cannot make deliveries. The absolute minimum on steel bars is 1.40c., and some contracts for first quarter have been made at 1.45c., while in a few cases, where deliveries run into the second puarter, 1.50c. has been paid. Bar-iron mills report the new demand stronger and they are running at heavier capacity than for many months. We quote steel bars at 1.40c. for delivery over the remainder of this year and 1.40c. to 1.50c. for first quarter of 1916. Common iron bars are firm at 1.40c.; refined iron bars, 1.50c.; and railroad test bars, 1.50c. to 1.55c., all f.o.b., Pittsburgh.

Shafting.—The new demand is unprecedentedly heavy. Two local makers say they have their entire output sold up for at least six months, with orders in sight for practically a year. The automobile builders, screw stock concerns and implement trade are all specifying heavily. It is believed that discounts on shafting will be lowered two or more points in the near future. The recent advance in prices was $2 per ton, instead of $4, as inadvertently stated in this report last week. We quote cold-rolled shafting at 60 per cent off in carloads, and 55 per cent in less than carloads, f.o.b., Pittsburgh.

Merchant Steel.—Specifications are pouring into the mills at a very lively rate, while new demand is very heavy. Output and shipments of the various grades of merchant steel this month are expected to break all records. Prices are very firm and are at least $2 per ton higher. On small lots quotations are: Iron finished tire, ½ x 1½ in. and larger, 1.70c. base; under ½ x 1½ in., 1.85c.; planished tire, 1.90c.; channel tire, ¾ to ⅞ and 1 in., 2.20c. to 2.30c.; 1 x ⅛ in. and larger, 2.30c; toe calk, 2.30c. to 2.40c., base; flat sleigh shoe, 2.05c.; concave and convex, 2.10c.; cutter shoe, tapered or bent, 2.60c. to 2.70c.; spring steel, 2.30c. to 2.40c.; machinery steel, smooth finish, 2.10c.

Nuts and Bolts.—Makers report the new demand for nuts and bolts very heavy and export business active. Most consumers are covered over the remainder of this year and in some cases into first quarter. As prices on steel will likely be higher, it is generally expected that nuts and bolts will show another advance in the near future. Discounts now in effect are as follows: Common carriage bolts, ⅜ x 6 in., and shorter and smaller, rolled thread, 70, 10 & 10; cut thread, 75, 10 & 5; larger or longer, 75 & 5. Machine bolts with h. p. nuts, ⅜ x 4 in., and shorter and smaller, rolled thread, 75 & 5; cut thread, 75, 10 & 5; larger or longer, 75 & 10. Machine bolts with c. p. c. t. and r. nuts, ⅜ x 4 in., and shorter and smaller, 75, 10 & 2½; larger or longer, 70, 10 & 7½. Blank bolts, 75 & 10. Bolt ends with h. p. nuts, 75 & 10; with c. p. c. and t. nuts, 70, 10 & 7½. Lag screws (cone or gimlet point), 80 & 15. Square nuts, h. p., tapped or blank, $6 off list; hexagon, $6.70 off; c. p. c. t. and r. nuts, tapped or blank, square, $5.50 off; hexagon, ⅝ in. and larger, $7 off; smaller, $7.50 off; semi-finished nuts, ⅝ in. and larger, 85 & 10; smaller, 85, 10 & 10. Rivets, smaller than ½ in. in diameter, 80 & 10. All the foregoing prices are f.o.b. Pittsburgh, subject to an actual freight allowance not to exceed 20c. per 100 lb. on shipments of 300 lb. or more.

Wrought Pipe.—Merchant iron and steel pipe is in only fair demand, not representing more than 50 to 60 per cent of mill capacity. Reports are that a local interest has taken about 70 miles of 14 or 16-in. pipe for a gas line, but this is not confirmed. Discounts on black and galvanized iron and steel pipe are quite firmly held.

Boiler Tubes.—A good many contracts from locomotive shops have been placed recently for delivery in the last quarter of this year and first quarter of 1916. The new demand for merchant tubes is better than for a long time. Discounts as given on a previous page are firmly held.

Coke.—There is quite a heavy demand for blast-furnace coke for both first half and for all 1916. A local interest has taken two such contracts, aggregating about 21,000 tons per month, for all 1916 delivery, at $2.25 per net ton at oven. The Pittsburgh Steel Company has closed with a local interest for about 18,000 tons per month for all 1916 at $2.10 or $2.15 per net ton at oven, for its second stack, blown in last August, the coke for the other stack being supplied on an old contract by the W. J. Rainey interest, which runs to July 1. Several contracts on a sliding scale basis are under negotiation. They will likely be based on about $13 minimum for basic iron and $1.75 coke, the coke operator to get one-fifth of any advance in the price of basic pig iron. There is some inquiry for foundry coke for first quarter and first half, and prices are firm. There is not much inquiry for prompt furnace coke, but prices are higher. We quote standard makes of furnace coke for prompt shipment at $1.85 to $1.90, and on contracts for first half and for all 1916, $2.25 per net ton at oven. We quote best grades of 72-hr. foundry coke for prompt shipment at about $2.25, and on contracts for first half $2.40 to $2.50 per net ton at oven. The Connellsville *Courier* reports the output of coke in the upper and lower Connellsville regions for the week ended Oct. 2 as 397,589 net tons, an increase over the previous week of 8705 tons, the heaviest output in any one week for nearly two years. The H. C. Frick Coke Company, which started last week about 500 idle ovens, is now running 85 per cent of all its ovens, and working six days per week.

Old Material.—The heavy steel scrap in the Pennsylvania Lines West list, closed yesterday, 1000 tons or more, was sold to a Steubenville interest at $14.50 or better per gross ton. Large consumers are not as yet showing much interest in the market, nor are the dealers anxious to sell, as they believe prices will be better before long. The Carnegie Steel Company has been a heavy buyer of scrap for some months, and reports are that its stocks are low. The embargo on scrap routed to the Pittsburgh Steel Company, Monessen, Pa., has been lifted. There is some inquiry for low phosphorus melting stock, but prices are a little easier. We note sales of 1500 to 2000 tons at $19 to $19.50, delivered. We also note sales of 1000 tons of cast-iron borings at $9.25 to $9.50, delivered, and 600 tons of machine shop turnings at $8.50, delivered. A sale is reported of 2000 tons of heavy steel scrap at $13.75 per gross ton, delivered Youngstown. Dealers quote for delivery in the Pittsburgh and nearby districts that take the same rates of freight, as follows, per gross ton:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh delivery	$14.00 to $14.25
Compressed side and end sheet scrap	13.00 to 13.25
No. 1 foundry cast	13.00 to 13.25
Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district	12.25 to 12.50
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	14.25 to 14.50
No. 1 railroad malleable stock	12.25 to 12.50
Railroad grate bars	8.75 to 9.00
Low phosphorus melting stock	19.00 to 19.50
Iron car axles	18.50 to 19.00
Steel car axles	16.00 to 16.50
Locomotive axles, steel	19.75 to 20.25
No. 1 busheling scrap	11.50
No. 2 busheling scrap	8.00 to 8.25
Machine shop turnings	8.50
Old carwheels	13.00
Cast-iron borings	9.25 to 9.50
*Sheet bar crop ends	13.50 to 14.00
Old iron rails	12.75 to 13.00
No. 1 railroad wrought scrap	13.00 to 13.25
Heavy steel axle turnings	10.25 to 10.50
Heavy breakable cast scrap	12.50 to 12.75

*Shipping point.

Chicago

CHICAGO, ILL., Oct. 12, 1915.

The real stress of conditions is just beginning to be felt in the West. Contracts which do not expire until Jan. 1 have thus far protected the larger number of steel users with respect to both prices and delivery from the difficulties which are confronting the buyer who enters the market now. The first of the year will bring sharply a fuller appreciation of the scarcity of steel. It will be felt with particular severity in those lines where the demand for the particular product itself would be normally insufficient to warrant any advance. With billets a much more profitable product than sheet bars, a scarcity of the latter seems a certainty, a fact which will unquestionably affect the sheet market. Concerning such materials as the railroads have already indicated their intention of buying, they are showing a decided interest in placing for early delivery. From the mill standpoint the situation has been very much cleared by the recent railroad activity, and some of the mills can now see the first half of the year program well filled. The very limited demand for structural steel, as indicated by new business up for figures, again

points to the fact that structural mill capacity is not so much occupied in the rolling of that material as it is proscribed by shortage of steel and the rolling of bars. The scarcity of bar-iron business is an interesting condition. With the exception of blue-annealed, the buying in sheets is also light. Store trade grows steadily heavier, though the demand does not yet reflect the full measure of current mill delivery conditions. Pig-iron inquiry, while probably not as heavy as at the height of the buying movement, includes a number of important tonnages, and, with respect to prices, another upward movement has already been started by some of the furnaces.

Pig Iron.—New inquiry coming into the market the past week includes a round lot of basic and several lots of 1000 to 2000 tons of foundry iron. Quotations brought out by this inquiry and also by the sales of the past week indicate the putting into effect of higher prices by both Northern and Southern furnaces, although for local irons no uniform advance has been announced. One interest, which has but one of its two furnaces in blast, is asking $15.50 for any delivery, but this appears to be an extreme position. For high phosphorus Northern iron, $14 at furnace was done last week, and for No. 2 foundry of other analysis $14.50 was made for several tonnages. Southern iron was last week sold as low as $11.50, Birmingham, for prompt shipment, but $12 now appears to be the minimum for direct-from-furnace iron and $12.50 the market for first quarter delivery. A sale of 1000 tons of silvery iron indicates a furnace price of $19 for 10 per cent. The recent purchase of 2000 tons of Bessemer iron from the mill at the Soo for export to France by the American Radiator Company was interesting because of its shipment by lake to Chicago and rail to New Orleans rather than by the customary Eastern seaboard routing. Current rates via Atlantic ports made possible a substantial saving in freights by the other routing. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace, and do not include a switching charge averaging 50c. a ton:

Lake Superior charcoal, Nos. 2 to 5	$15.75 to $16.25
Lake Superior charcoal, No. 1	16.25 to 16.75
Lake Superior charcoal, No. 6 and Scotch	16.75 to 17.25
Northern coke foundry, No. 1	14.75 to 15.25
Northern coke foundry, No. 2	14.25 to 14.75
Northern coke foundry, No. 3	14.00 to 14.25
Southern coke, No. 1 f'dry and 1 soft	16.00 to 16.50
Southern coke, No. 2 f'dry and 2 soft	15.50 to 16.00
Malleable Bessemer	15.00
Standard Bessemer	18.50
Basic	13.75 to 14.00
Low phosphorus	26.50 to 27.00
Silvery, 8 per cent	21.00 to 21.50
Silvery, 10 per cent	21.50 to 22.00

Rails and Track Supplies.—The railroads are pushing negotiations covering their recent inquiries for rails as rapidly as possible and are specifying a considerable proportion of the total tonnage for delivery this fall. No new inquiry is reported. We quote standard railroad spikes at 1.65c. to 1.70c., base; track bolts with square nuts, 2.05c. to 2.10c., base, all in carload lots, Chicago; tie plates, $30, f.o.b. mill, net ton; standard section Bessemer rails, Chicago, 1.25c., base, open hearth, 1.34c.; light rails, 25 to 45 lb., 1.16c.; 16 to 20 lb., 1.21c.; 12 lb., 1.26c.; 8 lb., 1.31c.; angle bars, 1.50c., Chicago.

Structural Material.—Building work in the West is still of little importance, and, while there have been enough small jobs to give most of the fabricating shops a foundation upon which to establish a better level of prices, the tonnage from this source has little to do with the crowded condition of the mills. Car steel has been a consideration, but recent buying of cars in the West has been considerably below the capacity of the car shops. Contracts for fabricated steel placed last week include three awards to the American Bridge Company for a total of 1075 tons, of which the most important was 800 tons for Northern Pacific Railway Company bridges. A. Bolter's Sons took two small jobs totaling 295 tons. The Mount Vernon Bridge Company will fabricate 575 tons for the new mill of the Interstate Iron & Steel Company at Cambridge, Ohio, and the Vulcan Mfg. Company, Fond du Lac, Wis., will furnish the steel for a municipal building at Sheboygan, Wis. The Great Northern Railway is in the market for 3000 tons of bridge steel. For open quotations on structural steel the market is now very clearly on the basis of 1.40c., Pittsburgh, and we quote for Chicago delivery from mill 1.589c.

The advance in store prices appears to have been discounted by the trade, and the steadily growing volume of orders has not been interrupted. We quote for Chicago delivery out of stock 2c.

Plates.—Insistence upon 1.35c., Pittsburgh, as the minimum for plates has become more marked, and some of the mills report sales at 1.40c. without any special conditions as to prompt delivery. Mill deliveries on plates are not so protracted as is the case with other of the heavy steel products, but demand is very limited. We quote for Chicago delivery of plates from mill 1.539c.

We quote for Chicago delivery of plates out of stock 2c.

Sheets.—Blue annealed sheets continue to be the only grade for which there is a substantial demand, and the only grade the mill bookings of which run very far ahead. Present prices for black sheets, which are based upon low-price sheet bars, can hardly endure for an extended period in view of the rapidly growing scarcity of sheet bars. Mills making both billets and sheet bars are naturally curtailing their output of the latter in favor of the more profitable billets. We quote for Chicago delivery from mill, No. 10 blue annealed, 1.789c.; No. 28 black, 2.189c.; No. 28 galvanized, 3.689c. to 3.789c.; heavy gages, 3.439c.

We quote for Chicago delivery from jobbers' stock as follows, minimum prices applying on bundles of 25 or more: No. 10 blue annealed 2.20c.; No. 28 black, 2.55c.; No. 28 galvanized, 4.35c.

Bars.—Improvement in bar-iron business is very short lived and uncertain. This week finds some of the mills with little or no tonnage ahead and on the verge of shutdowns. Conditions are not such, however, as to bring the strength of prices into question. Some of the iron mills are rolling steel for prompt shipment from billets, and sales at prices as high as 1.60c., at the mill, have been made. There is a dearth of inquiry for Bessemer bars which doubtless could be obtained upon advantageous terms of price and delivery. The steel-bar situation presents no new phases. We quote mill shipment, Chicago, as follows: Bar iron, 1.35c.; soft steel bars, 1.589c.; hard steel bars, 1.30c. to 1.35c.; shafting, in carloads, 63 per cent off; less than carloads 58 per cent off.

We quote store prices for Chicago delivery: Soft steel bars, 1.90c.; bar iron, 1.90c.; reinforcing bars, 1.85c. base, with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting 52 per cent off.

Rivets and Bolts.—Rivet makers are strengthening their attitude and adhering more generally to the quotation of 1.85c., Chicago, at which level Western prices are still below those prevailing in other markets. There is no marked activity in the bolt trade, and manufacturers appear still unable to bring their prices up to the level of nominal quotations. We quote as follows: Carriage bolts up to ⅜ x 6 in., rolled thread, 80-10; cut thread, 80-5; larger sizes, 75-5; machine bolts up to ⅝ x 4 in., rolled thread, with hot pressed square nuts, 80-15; cut thread, 80-10; larger sizes, 75-10; gimlet point coach screws, 80-15; hot pressed nuts, square, $6 off per cwt.; hexagon, $7 off per cwt. Structural rivets, ¾ to 1¼ in., 1.75c. to 1.85c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

We quote out of store: Structural rivets, 2c.; boiler rivets, 2.10c.; machine bolts up to ⅝ x 4 in., 75-15; larger sizes, 70-10-10; carriage bolts up to ⅝ x 6 in., 75-10; larger sizes 70-15 off; hot pressed nuts, square, $6, and hexagon, $6.70 off per cwt.

Cast-Iron Pipe.—New business develops very slowly, the only municipal letting of consequence for the coming week being 250 tons at Attica, Kan. The 150 tons at Hamilton, Ohio, were taken by the leading interest. Prices for pipe have been advanced $1 per ton. We quote as follows, per net ton, Chicago: Water pipe,

4 in., $28; 6 in. and larger, $26, with $1 extra for Class A water pipe and gas pipe.

Old Material.—The week has seen but little activity in the scrap market, most of the trading being confined to the covering of short orders by dealers. The few purchases by consumers were at the prices last quoted. Railroad offerings of scrap include 2000 tons disposed of by the St. Paul last week, 1500 tons by the Michigan Central, 4500 tons by the Southern Railway and 700 tons by the Soo Line. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Old iron rails	$13.50 to $14.00
Relaying rails	19.50 to 20.50
Old carwheels	12.00 to 12.25
Old steel rails, rerolling	13.25 to 13.75
Old steel rails, less than 3 ft	13.25 to 13.75
Heavy melting steel scrap	11.75 to 12.00
Frogs, switches and guards, cut apart	11.75 to 12.00
Shoveling steel	11.50 to 11.75
Steel axle turnings	9.75 to 10.00

Per Net Ton

Iron angles and splice bars	$13.75 to $14.00
Iron arch bars and transoms	13.75 to 14.25
Steel angle bars	10.75 to 11.25
Iron car axles	15.50 to 16.00
Steel car axles	16.50 to 17.00
No. 1 railroad wrought	11.00 to 11.50
No. 2 railroad wrought	10.50 to 10.75
Cut forge	10.50 to 10.75
No. 1 busheling	9.25 to 9.75
No. 2 busheling	7.25 to 7.50
Pipes and flues	8.50 to 9.00
Steel knuckles and couplers	11.25 to 11.75
Steel springs	12.25 to 12.75
No. 1 boilers, cut to sheets and rings	8.50 to 8.75
Boiler punchings	10.75 to 11.00
Locomotive tires, smooth	11.00 to 11.50
Machine shop turnings	7.00 to 7.25
Cast borings	6.50 to 7.00
No. 1 cast scrap	10.50 to 11.00
Stove plate and light cast scrap	8.75 to 9.00
Grate bars	8.50 to 8.75
Railroad malleable	10.25 to 10.75
Agricultural malleable	9.00 to 9.50

Wire Products.—The wire trade is featured by the large proportion of prompt shipment specifications and in view of the tremendous export demand for some classes of wire the deliveries being made by the mills are surprising. The demand for wire nails is steadily improving. Quotations to jobbers, per 100 lb., are as follows: Plain wire, No. 9 and coarser, base, $1.789; wire nails, $1.939; painted barb wire, $2.089; galvanized barb wire, $2.789; polished staples, $2.089; galvanized staples, $2.789, all Chicago.

Philadelphia

PHILADELPHIA, PA., Oct. 12, 1915.

Efforts of consumers to cover their 1916 needs are becoming more pressing, but the mills continue to decline the acceptance of commitments for next year, intimating that when they do so it will be at higher prices than now prevail. There is a growing reluctance to sell billets because of the fancy prices that can be obtained for finished products, notably steel rounds. Next year's consumption of rounds is certain to be immense. Meanwhile the railroads are doing better in all directions, including rails, track supplies, cars, etc. For blooms and bars the inquiry for foreign shipment is greater than ever. Considerable foreign inquiry is coming out for basic pig iron. Jobbing foundries have been more active purchasers of small lots, and from this it is deduced that they are becoming busier. Few of the smaller consumers have bought for next year. The demand for low phosphorus pig iron is coming out persistently, and prices continue their upward trend. Some round lots of pipe iron have been purchased. Several furnace coke contracts have been made at $2.25 at oven.

Pig Iron.—Evidence that the general foundry trade is getting busier is presented in the greater amount of small-lot purchasing where immediate deliveries are specified. There have been no transactions involving large lots, for the reason that the big consumers are covered, for this year at least. On the whole the aggregate of buying is less. The first class referred to shows little disposition to buy for next year at present prices, preferring to await the developments of November and December. Quotations for all deliveries are unchanged, but firm. Eastern Pennsylvania No. 2 X can be had at $16.29, delivered, this quarter, and $17.29, delivered, next quarter. At these prices several sales have been made. Business has been active in small lots of Virginia No. 2 X at $13.50, furnace, or $16.25 delivered, although some of the producers adhere to $14, furnace, or $16.75, delivered, prompt shipments. Sellers at the minimum have done practically all of the business and their shipments to date are running ahead of the excellent pace of September. The pipe foundry which recently inquired for 15,000 tons has withheld orders, it is said, because of an unwillingness to accept quotations, but at least two other pipe makers have bought iron, one taking a round lot of Virginia. A few thousand tons of basic, probably less than 6000 tons, was taken by a New Jersey wire company at $17.50 delivered, first quarter. Export houses are inquiring for several thousand tons of basic for Europe, one such inquiry calling for 5000 tons. The purchase by the Midvale Steel Company of the Worth Brothers Company's plant at Coatesville, Pa., is regarded with a certain amount of satisfaction by the pig-iron trade, as the belief is held that the transfer will operate to keep the surplus basic iron at the Worth plant off the market. At last accounts this surplus amounted to upward of 60,000 tons. Persistent inquiry continues to come out for standard low phosphorus iron, which is almost an essential requisite in the manufacture of ordnance, projectiles, fine wire, etc. Makers, none of whom have much to sell, are quoting $26.50 to $27.50, delivered. Lebanon low phosphorus is quoted at $23 to $24, furnace, 1500 tons having been sold at $23.50, furnace. Quotations for standard brands, delivered in buyers' yards, shipment this year, range about as follows:

Eastern Penna., No. 2 X foundry	$16.25 to $16.75
Eastern Penna., No. 2 plain	16.00 to 16.50
Virginia, No. 2 X foundry	16.25 to 16.75
Virginia, No. 2 plain	16.00 to 16.25
Gray forge	15.25 to 15.50
Basic	17.00 to 17.50
Standard low phosphorus	26.50 to 27.50

Iron Ore.—Arrivals at this port in the week ended Oct. 9 consisted of 6721 tons from Sweden and 4750 tons from Cuba. In view of the higher ocean freight rates, new business in foreign ore is more remote than ever.

Ferroalloys.—Sales of a few hundred tons of 80 per cent ferromanganese, November and December deliveries, are reported at $100, seaboard. In general the situation is without change, practically the only spot stocks being those of domestic manufacture, for which $110 to $115 is obtainable.

Bars.—The minimum quotation for steel bars is 1.45c., Pittsburgh, or 1.609c., Philadelphia. Contracts are being cleaned up rapidly, and inquiry for the first quarter is increasing, but the mills are as reluctant as ever to sell into 1916. When they do, it is asserted, they will want higher prices than now prevail. The demand for steel rounds shows no abatement and totals thousands of tons. A good part of the inquiry comes from shell-makers who want to protect themselves with contracts covering next year. For such rounds an eastern Pennsylvania mill is asking slightly over 3c.; others name a little under this figure. Iron bars are strong and active at 1.559c., Philadelphia, having been advanced $1 per ton.

Plates.—The quotation for plates is under that for bars, inasmuch as 1.40c., Pittsburgh, or 1.559c., Philadelphia, can be done. Plates at 1.509c., Philadelphia, have disappeared. A leading mill rigidly quotes 1.609c., Philadelphia, as its minimum and is running behind in deliveries. In plates, also, there is little or no acceptance of orders for first quarter delivery. Railroad work is coming to the mills more freely, and the shipyards are ordering actively for the boats they have in hand. Much of this ship material was taken at much lower prices than are now quoted.

Structural Material.—Continued demand and the effort to appease customers add to the difficulty of adjusting rolling schedules. Eastern Pennsylvania mills still decline to go into the first quarter. Some recently made contracts are running for delivery this year at 1.559c., Philadelphia. On current business makers are asking 1.659c., Philadelphia, and for material out of stock, 1.759c. Plans are out for the building of the Consolidated Gas & Electric Company, Baltimore, Md., which will require about 3000 tons.

Sheets.—No. 10 blue annealed sheets are quoted at 1.759c. to 1.859c., Philadelphia, and the demand continues good.

Billets.—The shortage of steel and the unwillingness of some producers to sell make the actual level of billet prices difficult to gage. A local mill has obtained $55 for an open-hearth rolling billet somewhat special in character, quoting ordinary billets at $50, though admitting that this figure is nominal and really intended to keep business away. Another maker, while admitting the uncertainty of the situation, quotes ordinary rerolling billets at $30 to $32, and forging billets at $38 and upward, according to specifications. As a matter of fact, the exigencies of each transaction determine the price. For certain finished products, such as rounds, prices can be obtained which make unattractive the selling of semi-finished steel.

Rails.—The Baltimore & Ohio Railroad, which is reported to have placed orders for 62,500 tons of rails, gave 11,000 tons to the Maryland Steel Company and 26,000 tons to the Cambria Steel Company.

Coke.—Several contracts for furnace coke have been placed at $2.25 per net ton at oven. It is regarded as singular that contracts are now being placed for the entire year 1916 at less than was quoted for the first half a few weeks ago. Already there is a shortage of labor in the coke fields, and with the approach of cold weather it is expected to become more acute. The increasing shipments aggravate the situation. November and December furnace coke is quoted at $2 to $2.25. Prompt and contract foundry is quoted at $2.30 to $2.60, some grades running up to $2.85 for delivery in the first half. Freight rates from the principal producing districts are as follows: Connellsville, $2.05; Latrobe, $1.85, and Mountain, $1.65.

Old Material.—The market continues quiet, but generally firm. The mills would take on material if they could get concessions from quoted prices, but dealers will not meet them. The railroad lists offered at the opening of the month went at high prices and it is assumed that consumers bought freely, for many dealers' bids were rejected. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania and taking in freight rates from 35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	$15.00
Old steel rails, rerolling	$15.50 to 16.00
Low phos. heavy melting steel scrap	20.50 to 20.75
Old steel axles	19.50 to 20.50
Old iron axles (nominal)	22.00 to 23.00
Old iron rails	18.50 to 19.00
Old carwheels	14.00 to 14.50
No. 1 railroad wrought	16.00 to 16.50
Wrought-iron pipe	13.50 to 14.00
No. 1 forge fire	11.00 to 11.50
Bundled sheets	11.00 to 11.50
No. 2 busheling	9.50 to 10.00
Machine shop turnings	10.25 to 10.50
Cast borings	10.50 to 10.75
No. 1 cast	14.00 to 14.50
Grate bars, railroad	10.50 to 11.00
Stove plate	10.50 to 11.00
Railroad malleable	10.50 to 11.00

The Harrisburg Pattern & Model Company, recently organized by Thomas E. Kohr and Harrison Clay, 28-34 North Cameron Street, Harrisburg, Pa., has completed patterns for large rolls for rolling steel plates, to be used at the No. 1 mill of the Central Iron & Steel Company, Harrisburg. The company has also furnished estimates for the patterns to be used in the enlarging of the open-hearth furnaces at the Central plant.

The Champion Iron Company, Kenton, Ohio, has been given a contract for the erection of a light house on Navassa Island in the West Indies.

Cincinnati

CINCINNATI, OHIO, Oct. 13, 1915.—(*By Wire.*)

Pig Iron.—The market shows more activity, but transactions are mostly carried on under cover. Quite a lot of prospective business has been resurrected by salesmen on direct solicitation. A number of fair sized sales have been made to nearby consumers, included in which is one for 1000 tons of Southern foundry iron to a local melter for first half. Two southern Ohio foundries also contracted for approximately 500 tons each of Southern iron for the same delivery. Among inquiries for Southern foundry is one for 600 tons from Indiana and another for 500 tons from northern Ohio, both for first half. No basic sales have been made in this immediate territory the past week but considerable business is understood to be pending. Southern foundry iron prices are generally much firmer but $11.50, Birmingham basis, for both resale and some furnace iron can still be done, for prompt shipment. The majority of Southern furnaces are holding firmly at $12 for this year and from $12.50 to $13 for first half. Northern No. 2 foundry is unchanged at $14.50, Ironton, for movement this year and at $15 for first half. On account of the demand for basic iron it is reported that the southern Ohio furnaces have reduced their stocks of foundry iron to a considerable extent lately, as a large part of the present production is of steel-making iron. Although the malleable situation is improving, no inquiries of importance are out and the price is the same as for Northern No. 2 foundry. In spite of labor troubles in several machine shops here, the local foundries have not held up any shipments but on the contrary have taken more iron than was due them. The silvery irons are very strong, with $18 at furnace quoted for this year's shipment and $18.50 for the first quarter. A Michigan manufacturer wants 1000 tons of standard Bessemer for first half. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft.	$14.90 to $15.40
Southern coke, No. 2 f'dry and 2 soft.	14.40 to 14.90
Southern coke, No. 3 foundry	13.90 to 14.40
Southern No. 4 foundry	13.40 to 13.90
Southern gray forge	12.90 to 13.40
Ohio silvery, 8 per cent silicon	19.26
Southern Ohio coke, No. 1	16.76 to 17.01
Southern Ohio coke, No. 2	15.76 to 16.01
Southern Ohio coke, No. 3	15.51 to 15.76
Southern Ohio malleable Bessemer	15.76 to 16.01
Basic, Northern	15.76 to 16.01
Lake Superior charcoal	16.20 to 17.20
Standard Southern carwheel	26.90 to 27.40

(*By Mail*)

Coke.—A contract for furnace coke, involving probably 20,000 tons, was lately made by a southern Ohio furnace interest. Other consumers in this territory are still holding back, although the majority of them have covered for nearby requirements quietly, but in a few instances long time contracts were made some time ago. An inquiry has been received locally from a consumer in Chicago territory for approximately 15,000 tons of 48-hr. coke for shipment each month of 1916, or a total of 180,000 tons for the period named. Foundry coke is somewhat slow, although shipments on contracts are moving at a satisfactory rate. We quote Connellsville 48-hr. coke, for prompt shipment, at $1.75 to $1.80 per net ton at oven. Future shipment quotations range all the way from $2 to $2.35. Connellsville foundry coke is unchanged around $2.35 to $2.65. Wise County and Pocahontas operators are quoting furnace coke for either prompt or future shipment close to prices named on foundry grades. A Michigan foundryman is expected to close soon for 10,000 tons of foundry coke for shipment in 1916.

Finished Material.—The mill and warehouse business in sheets shows some improvement. The nearby mills are now quoting 3.65c., Pittsburgh basis, on No. 28 galvanized and around 2.10c. on black sheets. No orders are solicited for delivery beyond Jan. 1. Cincinnati jobbers quote No. 28 galvanized sheets from stock at 4.35c. and No. 10 blue annealed at 2.20c. The local warehouse price on steel bars is 2c. and on structural shapes 2.10c. Warehouse stocks are understood

to be diminishing at a comparatively rapid rate, and the question of being able to make prompt delivery on both black and galvanized sheets, as well as steel bars, may be an important one very soon both with mills and jobbers. There is only a nominal demand for railroad track material.

Old Material.—Railroad offerings are only fair, but most local yards have a large supply of scrap on hand. The rolling mills are taking more old material than for the same period last month, and other consumers are melting about the same quantity as during the past three months. The minimum figures given below represent what buyers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations are dealers' prices, f.o.b., at yards:

Per Gross Ton

Bundled sheet scrap	$8.75 to $9.25
Old iron rails	12.25 to 12.75
Relaying rails, 50 lb. and up	20.25 to 20.75
Rerolling steel rails	11.00 to 11.50
Heavy melting steel scrap	10.50 to 11.00
Steel rails for melting	10.50 to 11.00

Per Net Ton

No. 1 railroad wrought	$9.50 to $10.00
Cast borings	6.50 to 7.00
Steel turnings	5.75 to 6.25
Railroad cast scrap	10.25 to 10.75
No. 1 machinery cast scrap	11.50 to 12.00
Burnt scrap	7.50 to 8.00
Old iron axles	15.25 to 15.75
Locomotive tires (smooth inside)	9.75 to 10.25
Pipes and flues	7.25 to 7.75
Malleable and steel scrap	8.50 to 9.00
Railroad tank and sheet scrap	6.50 to 7.00

Buffalo

BUFFALO, N. Y., Oct. 12, 1915.

Pig Iron.—Inquiry continues in large volume, aggregating about 30,000 tons for the week, for first quarter delivery, with sales of between 10,000 and 15,000 tons, basic malleable and foundry grades. This placement includes 2500 to 3000 tons of basic, taken at $16.50, furnace. More and more furnaces are confining their sales to the first quarter, as they are almost completely sold up to the end of the year, and are not willing to take on tonnage for delivery through the first half. They are even lukewarm with regard to the first quarter. They are taking into consideration the likelihood of enhanced prices after the first of the year. It is stated that an offer of $1 per ton last week for ore carriage on the Lakes could not get boats, and an offer of $1.50 per ton to Sarnia, Ont., for Canadian furnaces has just been declined. For current and first quarter delivery, 1916, we quote as follows, f.o.b. furnace, Buffalo:

Foundry of 4 to 5 per cent silicon	$17.00
No. 1 foundry	$16.25 to 16.50
No. 2 X foundry	15.50 to 16.00
No. 2 plain	15.50 to 15.75
No. 3 foundry	15.50
Gray forge	15.50
Malleable	15.50 to 16.00
Bessemer	16.00 to 16.50
Basic	16.50
Charcoal—regular grades and analysis	16.75 to 17.75
Charcoal—special grades and analysis	20.00 to 21.00

Finished Iron and Steel.—It is understood that some sales representatives have been unable to take care of business offered. Two or three of the largest mills are apparently out of the market for new business for the remainder of the year for bars, plates and shapes. It is reported that at least one of the larger independent mills is declining to take any new business for the first quarter of next year, and some agencies are even declining to take care of their old established contract customers because of their not having any mill capacity open for the last quarter of this year or the first quarter of next. Others of the larger independent mills report business offered them in excess of their capacity by 200 to 300 per cent. One of the larger independent wire mills is entirely out of the market for the sale of wire products for the remainder of the year. It continues to be a question of capacity rather than a question of price. Some mills have not withdrawn 1.40c., Pittsburgh, quotations, while others are quoting a minimum of 1.50c. for immediate and first quarter delivery. Considerable pressure has been brought to bear during the week for prices on tin mill sheets and tin plate for the first quarter and first half of next year. So far as can be learned, the mills are resolutely refraining from quoting at this time, believing that a higher price must be obtained for sheets and tin plate next year. Warehouse prices on bars, plates and shapes have advanced $1 per ton, steel bars and small shapes now being 2.10c., Buffalo; steel bars over 2 in., 2.45c.; structural shapes and plates, 2.15c.; No. 10 blue annealed sheets, 2.10c. Mill prices on plain black sheets have also advanced. The Buffalo Structural Steel Company has contracts for 200 tons for an addition for the Robertson-Cataract Electric Company, Buffalo; 100 tons for the Acheson Graphite Company, Niagara Falls, and a similar quantity for apartment house for William H. Fitzpatrick, Buffalo.

Old Material.—Machine shop turnings are weak due to excess production above consumption demand. The extensive activity on the part of so many plants engaged in the manufacture of shrapnel has loaded up the market with turnings of the lighter grade. Lines of scrap material that are kindred to pig iron are being held back to some extent by dealers, sales being confined to moderate amounts at present prices, as the dealers believe better prices will obtain shortly, in alignment with the stiffening pig-iron market. Owing to the continued scarcity of old iron axles and old steel axles, a further advance is noted, amounting to 50c. per ton. No. 2 Busheling scrap has also been marked up 50c. per ton. We quote dealers' asking prices per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	$13.00 to $13.50
Boiler plate, sheared	13.00 to 13.50
Low phosphorus steel	17.50 to 18.00
No. 1 railroad wrought scrap	12.50 to 13.00
No. 1 railroad and machinery cast	12.50 to 13.00
Old steel axles	19.00 to 19.50
Old iron axles	19.50 to 20.00
Old carwheels	12.75 to 13.25
Railroad malleable	12.50 to 13.00
Machine shop turnings	6.50 to 7.00
Heavy axle turnings	9.00 to 9.50
Clean cast borings	7.50 to 7.75
Old iron rails	15.50 to 16.00
Locomotive grate bars	9.50 to 10.00
Stove plate (net ton)	8.50 to 9.00
Wrought pipe	10.50 to 11.00
Bundled sheet scrap	9.50 to 10.00
No. 1 busheling scrap	10.00 to 10.50
No. 2 busheling scrap	9.00 to 9.50
Bundled tin scrap	10.00

Cleveland

CLEVELAND, OHIO, Oct. 12, 1915.

Iron Ore.—Shipments are not so heavy as they were last month, owing to the fact that boats are being diverted to the grain trade. While the vessel situation has eased a little, rates in excess of 5c. are still being paid for boats for grain. The market is inactive. No sales are reported and no new inquiries have come out. We quote prices as follows delivered to the lower Lake ports: Old range Bessemer, $3.85; Mesaba Bessemer, $3.45; Old Range non-Bessemer, $3; Mesaba non-Bessemer, $2.85.

Pig Iron.—The market in this territory is dull, but local selling agencies report a fair volume of inquiries from surrounding districts. Foundries generally in this territory are deferring their purchases of iron for delivery until after Jan. 1. Some feel there will be no further advance in prices in the near future, and others will carry considerable iron over to next year, having purchased enough low-priced iron early in the summer for second half delivery to last them about through the first quarter. While most foundries are well filled with work, there are some plants not engaged in machine-tool or automobile work that are not running over about 60 per cent of capacity. The market is generally firm, the only weak spot being in the Valley, where No. 2 foundry iron can still be had at $14.50 for the remainder of the year. One inquiry has come out from the Pittsburgh district for 10,000 tons of Bessemer iron for the first half, but producers are not disposed to quote on this iron for that delivery. Southern iron is inactive, although there are some new market feelers for small lots. Producers are asking $12, Birmingham, for No. 2 Southern for last quarter delivery and $12.50 for first half, but some resale iron can still be had at about $11.50 for prompt ship-

ment. Valley prices on low phosphorus iron have been advanced $1 per ton. We quote, delivered Cleveland, as follows:

Bessemer	$16.95
Basic	15.80
Northern No. 2 foundry	15.30
Southern No. 2 foundry	$15.50 to 16.50
Gray forge	14.80
Jackson Co. silvery, 8 per cent silicon	19.62 to 20.12
Standard low phos., Valley furnace	$24.50 to 25.00

Finished Iron and Steel.—A fairly heavy volume of business in contracts for steel bars and structural material largely for the first quarter, was placed the past week, and the 1.40c., Pittsburgh, price for contracts that prevailed a week ago has practically disappeared. Quotations for contracts now range from 1.45c. to 1.50c., Pittsburgh. Some second quarter business has been taken at 1.45c., but after a stiffening of the market contracts for steel bars and structural material have been booked at 1.50c. for the first half. Some of the mills so far have taken very few contracts for next year as they are holding out for better prices. Universal plates are scarce and sales are being made at 1.50c., Pittsburgh, for delivery elsewhere. The McClintic-Marshall Company has taken 825 tons of structural material for new plants of the Van Dorn & Dutton Company and the Van Dorn Electric Tool Company, Cleveland, Ohio, being awarded the general contract for the plants. The Massillon Bridge & Structural Company has taken 100 tons for the new foundry for the Dunham Company, Berea, Ohio. The Willys-Overland Company, Toledo, Ohio, has plans under way for a new building that will require 1500 tons. Black and blue sheets are in good demand and prices are firmer. We quote No. 28 black at 2c. to 2.10c. at mill and No. 10 blue annealed at 1.65c. to 1.75c. Galvanized sheets are quoted at 3.50c. to 3.65c. at mill for No. 28. Shafting is very firm, and some sales are being made at 2 to 3 points lower than the recent advance in price. Hard steel bars have advanced to 1.35c., Pittsburgh. Bar iron is firm at 1.50c., Cleveland. An inquiry for Bessemer sheet bars for first quarter delivery has brought out a quotation of $26, Youngstown. Warehouse prices are 2c. for steel bars and 2.10c. for plates and structural material.

Bolts, Nuts and Rivets.—A number of the leading railroads are in the market for their bolt and nut requirements for the first half of next year, but may be unable to place contracts for that delivery at present prices. Specifications are heavy and prices are well maintained. The demand for rivets is active. Local makers are quoting rivets at the recent advance to 1.90c., Pittsburgh, for structural rivets and 2c. for boiler rivets. Bolt and nut discounts are as follows. Common carriage bolts, ⅜ x 6 in., smaller or shorter, rolled thread, 75, 10 and 10 per cent; cut thread, 75, 10 and 5; larger or longer 70, 10 and 10; machine bolts with h.p. nuts ⅜ x 4 in., smaller or shorter, rolled thread, 75, 10, 10 and 5; cut thread, 75, 10 and 10 per cent; larger and longer 75 and 5; coach and lag screws, 80 and 15; square h. p. nuts, blank or tapped, $5.80 off the list; hexagon h. p. blank or tapped, $6.30 off; c. p. c. and t. square nuts, blank or tapped, $5.30 off; hexagon ⅝ in. and larger, $6.75 off; 9/16 in. and smaller, $7.25 off; cold pressed semi-finished hexagon nuts ⅝ in. and larger, 85 off; smaller, 85 and 10.

Coke.—A small amount of by-product coke has been sold in this territory recently, but sellers are not meeting with much success in getting orders because of the price. This coke is quoted at $3.75, Indianapolis, which makes the delivered price from $1 to $1.25 above the price of Connellsville foundry coke. We quote standard makes of Connellsville foundry coke at $2.25 to $2.50 per net ton at oven for prompt shipment and $2.50 to $2.75 for contract. Furnace coke is held at $1.75 to $1.85 for spot shipment and $2.25 for the remainder of the year. For the first half, producers are asking $2.50.

Old Material.—The demand is light and this, with embargoes and refusals of mills to accept shipments, has had a weakening effect on the market. Local consumers are buying very little and Youngstown mills are out of the market. We note the sale of 1500 tons of steel car axles for export to Italy at $20 per gross ton. The American Shipbuilding Company will sell this week over 11,000 tons of heavy melting steel scrap, an accumulation of three years at its various plants. Turnings are very dull and weak. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton

Old steel rails	$13.00 to $13.50
Old iron rails	14.00 to 14.50
Steel car axles	19.00 to 20.00
Heavy melting steel	12.75 to 13.00
Old carwheels	11.75 to 12.00
Relaying rails, 50 lb. and over	22.50
Agricultural malleable	10.00 to 10.25
Railroad malleable	13.00 to 13.50
Steel axle turnings	10.00 to 10.25
Light bundled sheet scrap	11.00 to 11.25

Per Net Ton

Iron car axles	$17.25 to $17.75
Cast borings	7.00 to 7.25
Iron and steel turnings and drillings	6.00 to 6.25
No. 1 busheling	9.75 to 10.25
No. 1 railroad wrought	11.75 to 12.00
No. 1 cast	11.00 to 11.25
Railroad grate bars	9.00
Stove plate	9.25 to 9.50

Birmingham

BIRMINGHAM, ALA., Oct. 11, 1915.

Pig Iron.—With a record output in September by Alabama furnaces, the market is firm at $12 spot and $12.50 for first quarter of 1916 with some interests asking higher prices. From 30,000 to 40,000 tons was sold in the first week of the month at these figures. Two furnace operators sold more than their current make of six active stacks. Notwithstanding the reports of lower-priced metal obtainable at Birmingham, it is notable that there was no withdrawal of warrants from the accumulations during October. That the $12 spot price for No. 2 is firmly maintained is evidenced by the sale of several thousand tons of No. 3 for Birmingham consumption at $11.50. From what can be gathered from various makers, it would seem that they have pretty well disposed of their production for the first quarter of 1916. Shipments have been heavy, the accumulations of free foundry iron dropping in September from 160,000 tons to 135,000 tons. Only one iron maker has an appreciable amount of iron on hand for sale and only two makers have what might be termed considerable stocks. Accumulations of the Sloss-Sheffield Company, which at one time exceeded 140,000 tons, are down to about 75,000 tons. The leading interest, with no stocks and well sold into 1916, still asks $13.50, but so far that price has not brought business. We quote, per gross ton, f.o.b. furnace, for spot and first quarter of 1916 as follows:

No. 1 foundry and soft	$12.50 to $13.00
No. 2 foundry and soft	12.00 to 12.50
No. 3	11.50 to 12.00
No. 4	11.25 to 11.75
Gray forge	11.00 to 11.50
Basic	12.00 to 12.50
Charcoal	21.00 to 21.50

Cast-Iron Pipe.—Orders for water and gas pipe are not so heavy as they have been. In fact, one maker says there are not so many as at this time in 1914. However, owing to prior bookings, the output has not yet declined and is taken care of. Prices are firm and the trend is higher on account of the status of the iron market. We quote, per net ton, f.o.b. pipe shop yards as follows: 4-in., $22; 6-in. and upward, $20, with $1 added for gas pipe. Sanitary pipe continues dull and small in output.

Coal and Coke.—Coke is harder to get and prices are very firm. The demands from the furnaces are heavy and one interest, having its own ovens, is buying coke. We quote, per net ton, f.o.b ovens, as follows: Beehive furnace, $2.75 to $3; beehive foundry, $3 to $3.25, with some makes at $3.50; by-product furnace, $2.50 to $2.75; by-product foundry, $2.75 to $3. The domestic coal trade has picked up owing to the approach of cold weather, but the large steam coal mines report a very slow betterment. The short cotton crop will call for smaller cotton oil mill operations and the general small trade has not reasserted itself yet. The railroads have put in effect the advanced rates to New Orleans and will seek to have the

Intertsate Commerce Commission modify its order placing land and bunker coal on the same basis. The Frisco has made a low rate for assembling coal from nearby mines to docks on the Warrior River for river transportation. It is believed the increase in raw material rates from mines to furnaces asked by the carriers will be accepted on condition that they be not again changed for a series of years. A car shortage is already evident.

Old Material.—Dealers are doing a business of considerable volume, with prices firm. The local demand from steel works is excellent. Light scrap has been in special demand. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old iron axles	$13.50 to $14.00
Old steel axles	13.00 to 13.50
Old iron rails	12.50 to 13.00
No. 1 railroad wrought	9.50 to 10.00
No. 2 railroad wrought	8.50 to 9.00
No. 1 country wrought	8.50 to 9.00
No. 1 machinery cast	9.50 to 10.00
No. 1 steel scrap	9.50 to 10.00
Tram carwheels	9.50 to 10.00
Stove plate	8.00 to 8.50

St. Louis

ST. LOUIS, Mo., Oct. 11, 1915.

Pig Iron.—Sales aggregate well up in the thousands, but mostly in lots below 500 tons for a single quarter's delivery. Transactions are being closed promptly, evidencing the strength of the market. More Southern furnaces have withdrawn from the market, while some others are quoting $12.50 for last quarter and first quarter, and $13 for first half. The larger sales of the week included one of 10,000 tons of Northern basic, while another inquiry for 5000 tons of basic is still pending and may be increased if the price is right. Other sales were 2000 tons of malleable, 500 tons of No. 2 Southern foundry for last quarter delivery and a considerable number of smaller sales ranging down to carload lots. Specifications from the melters are increasing rapidly.

Old Material.—Local demand is increasing slowly, the buying being mostly of special grades for particular uses, with very little contracting ahead. There is, however, a good movement eastward and to the north, particularly of steel material suitable for use in the manufacture of war munitions, and the prices prevailing are profitable. Relaying rails are harder to get, and the demand for standard sections is increasing with accentuated difficulty in filling orders. Lists out during the week include 5000 tons from the Northern Pacific, 200 tons from the Cotton Belt, 2500 tons from the Big Four, 5000 tons from the Southern and 400 tons from the Vandalia. Prices are firmer than last week, and the dealers are very optimistic. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

Per Gross Ton

Old iron rails	$11.75 to $12.25
Old steel rails, rerolling	12.50 to 13.00
Old steel rails, less than 3 ft.	12.50 to 13.00
Relaying rails, standard section, subject to inspection	21.00 to 23.00
Old carwheels	10.50 to 11.00
No. 1 railroad heavy melting steel scrap	11.50 to 12.00
Heavy shoveling steel	10.50 to 10.75
Frogs, switches and guards cut apart	11.50 to 12.00
Bundled sheet scrap	7.50 to 8.00

Per Net Ton

Iron angle bars	$11.75 to $12.00
Steel angle bars	10.00 to 10.50
Iron car axles	15.75 to 16.25
Steel car axles	14.75 to 15.25
Wrought arch bars and transoms	13.75 to 14.25
No. 1 railroad wrought	10.25 to 10.50
No. 2 railroad wrought	9.75 to 10.25
Railroad springs	11.25 to 11.75
Steel couplers and knuckles	11.00 to 11.50
Locomotive tires, 42 in. and over, smooth inside	12.00 to 12.25
No. 1 dealers' forge	9.25 to 9.50
Mixed borings	6.00 to 6.50
No. 1 busheling	9.00 to 9.50
No. 1 boilers, cut to sheets and rings	7.50 to 8.00
No. 1 railroad cast scrap	10.50 to 10.75
Stove plate and light cast scrap	8.50 to 8.75
Railroad malleable	8.75 to 9.00
Agricultural malleable	7.75 to 8.00
Pipes and flues	7.25 to 7.75
Railroad sheet and tank scrap	7.00 to 7.25
Railroad grate bars	7.00 to 7.50
Machine shop turnings	7.00 to 7.50

Finished Iron and Steel.—Orders for finished products continue to improve. Insistence on delivery is strong, though three months is about the best now being promised. There is no disposition to improve shipping dates by premiums. Buyers willingly pay the advanced prices. In standard section rails the Wabash has placed an order for 7250 tons for replacement work, dividing it between the Steel Corporation and the Lackawanna Steel Company. For light rails demand is improving rapidly, with a considerable portion for export. Track fastenings are in good request. Movement out of warehouse is reported excellent, the postponements of contracting ahead as well as the increase of immediate needs leading to a willingness to pay the retail price. For stock out of warehouse we quote as follows: Soft steel bars, 1.95c.; iron bars, 1.90c.; structural material, 2.05c.; tank plates, 2.05c.; No. 10 blue annealed sheets, 2.25c.; No. 28 black sheets, cold rolled, one pass, 2.55c.; No. 28 galvanized sheets, black sheet gage, 4c., subject to spelter market changes.

Coke.—Specifications on existing contracts are increasing. The local by-product supply, however, continues to control the market.

New York

NEW YORK, Oct. 13, 1915.

Pig Iron.—The foundry iron market is by no means active. Some sales have been made at Buffalo furnace for shipment from New York State points and into New England, and on these prices have shown considerable variation. In one case over $16 at furnace was secured for No. 2 X foundry, but iron can be had for this year at $15.50 at Buffalo furnace and less. A sale of basic iron from Buffalo for delivery in New Jersey is reported at $18.35 delivered, the high manganese content bringing a higher price than was paid by the same buyers for eastern Pennsylvania iron. In all 5000 to 6000 tons was taken by the New Jersey plant. Somewhat increased foundry operation is reported, but foundries are generally well covered for this year and a number of them have iron bought at $2 to $3 below to-day's prices that will last one or two months into the new year. We quote at tidewater as follows for fourth quarter delivery: No. 1 foundry, $16.50 to $16.75; No. 2 X, $16.25 to $16.50; No. 2 plain, $15.75 to $16; Southern iron, $16.50 to $17 for No. 1 and $16.25 to $16.50 for No. 2.

Ferroalloys.—Sales in the past week of several lots of ferromanganese, aggregating about 700 tons, by the New York representative of a British producing company that has been out of the market for about two months show easier conditions in England. The transactions are subject to the usual restrictions, but the probability of securing the shipments is strong. The price was $100, seaboard. Other sales of small lots are being made at the same price and subject to the same conditions. Receipts, however, are very small as compared with normal and the future is exceedingly uncertain. Sales of domestic alloy are heard of at $100 to $115, seaboard, but they have been few. It is understood that the former figure has been shaded. The Eastern electrolytic company that was operating under a conversion agreement with an Eastern manganese ore dealer is not now producing the alloy, the contract being completed. The product of the Tata Iron & Steel Company of India, it is stated, will run as high as 0.70 per cent in phosphorus; this compares with about 0.25 per cent phosphorus for the British ferromanganese. The Tata Company uses about 75 tons per month in its own plant, and has a stock of about 1800 tons. Reports of foreign sales of domestic ferromanganese are not confirmed here. The spiegeleisen market is quiet. Ferrosilicon, 50 per cent, is still very strong and active. On the Canadian product an advance of $14 per ton is announced here, or from $71-$73 to $85-$87, Pittsburgh, the price varying according to tonnage. Large export demand and domestic orders have advanced the price.

Structural Material.—The divergence in ideas of proper prices for fabricated steel delivered is indicated in bids received by the New York Municipal Railways for work on the Brooklyn Rapid Transit lines. For the 60,000 tons of steel work involved, the American Bridge Company bid approximately $44.60 per ton as an average. The next lowest bidder for all the work was the Fort Pitt Bridge Company, the average bid of which was about $56.15, or $11.55 more per ton. At 1.40c., Pittsburgh, for the plain material, there is a margin for the fabrication and erection of $16.60 in the case of the lowest bid and of $28.15 per ton in the case of the other. The average unit bids of the McClintic-Marshall Company and of the Pennsylvania Steel Company were $57.90 and $58.35 respectively. New projects are not numerous and settlement of building and bridge projects in the East proceeds slowly. In all, some of it pending for a long time, there is not much over 30,000 tons in jobs running several hundred tons and more. The need of providing for the future in the face of the general heavy demand for steel is, however, felt by manufacturing consumers, as more is heard of contracts taken, at prices not ascertainable, for first quarter and first half of 1916. We quote mill shipments at 1.40c. to 1.50c., Pittsburgh, or 1.569c. to 1.669c., New York, with most new present quarter business at 1.619c., New York. For small lots from store we quote 2.10c. to 2.15c., New York.

Plates.—Late takers of contracts have been asked 1.45c., Pittsburgh, for October and November and 1.50c. and 1.55c. for December. Some contracts going into 1916 have been written at 1.50c. for the next year specifications and at least one for the last quarter at 1.45c. Premiums are being offered for deliveries in two weeks; in one case $3 was the advance promised over a contract at 1.30c., Pittsburgh, but so far as known not yet accepted by the steel company. One company, practically out of the market, is asking 1.50c. on all new business. Good size tonnage inquiries continue for export, but actual buying seems to be delayed. The Central of New Jersey has come into the market for 1000 hopper cars and the Atlantic Coast Line for 200 flat cars, and there are now nearly 7000 cars under consideration. We quote mill shipments of plates at 1.40c. to 1.50c., Pittsburgh, or 1.569c. to 1.669c., New York. Plates from store are 2.10c. to 2.15c., New York.

Iron and Steel Bars.—With one company practically out of the market for deliveries inside of four or five months, and this company asking 1.50c., Pittsburgh, on all new business, and a general advance of $1 per ton by the bar iron producers, price conditions continue strong. Little new inquiry for rounds for munitions has been noted, and it appears that most of the new business of this sort will come from American concerns with contracts for finishing shells, as machine shops on the other side are, for some time at least, well provided for in the matter of the steel. Export movement of steel bars for war purposes will, it is believed, be mostly of the exceptionally large rounds. Some of the large manufacturing consumers have this early closed for first half of 1916 requirements, but the prices are not stated. Bar iron at the new price is on a parity with the nominal price of bar steel but it can be obtained in two to three weeks against ten weeks to four and five months in the case of steel. We quote mill shipments of steel bars nominally at 1.40c., Pittsburgh, or 1.569c., New York, and refined iron bars, 1.569c., New York. Out of store in New York iron and steel bars are 2.05c. to 2.10c.

Cast-Iron Pipe.—No new announcements of public lettings have been made. The season is now so far advanced that little business of this character is expected to come out. Private buying, however, keeps up remarkably well. Prices are firmly held. Carload lots of 6-in., class B and heavier, are quoted at $24.50 to $25 per net ton, tidewater, class A and gas pipe taking an extra of $1 per ton.

Old Material.—Dullness continues. Steel works and rolling mills are evidently well supplied, and are buying little outside of what they are securing from railroad offerings. Inquiries are light. Brokers report that they are continuing to pay about as follows to local dealers and producers, per gross ton, New York:

Old girder and T rails for melting	$12.25 to $12.50
Heavy melting steel scrap	12.25 to 12.50
Relaying rails	19.50 to 20.00
Rerolling rails	13.00 to 13.50
Iron car axles	22.00 to 22.50
Steel car axles	17.50 to 18.00
No. 1 railroad wrought	14.00 to 14.50
Wrought-iron track scrap	13.00 to 13.50
No. 1 yard wrought, long	12.75 to 13.00
No. 1 yard wrought, short	12.25 to 12.50
Light iron (nominal)	4.00 to 4.25
Cast borings	7.75 to 8.00
Wrought turnings	7.75 to 8.00
Wrought pipe	11.00 to 11.50

The demand from foundries has shown no special activity. Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York:

Old carwheels	$12.00 to $12.25
No. 1 cast (machinery)	12.75 to 13.00
No. 2 cast (heavy)	11.75 to 12.00
Stove plate	9.75 to 10.00
Locomotive grate bars	9.50 to 10.00
Malleable cast (railroad)	10.00 to 10.50

British Market Firmer

Ore and Coke Higher—America Seeking Low Phosphorus Ore—Italy Buys American Iron

(*By Cable*)

LONDON, ENGLAND, Oct. 13, 1915.

The pig-iron market is cheerless because of the Balkan situation. Hematite iron, however, is strong at 102s. 6d. to 105s. Iron ores are firm, with freights advancing. Coke is dearer, and coal prices next year are expected to advance 20 per cent. Tin plates are firm at 17s. 9d. to 18s., with fair inquiry. Wages have been increased from 10 to 20 per cent, the advance to be operative immediately and to remain in force until July, 1916.

America is inquiring for low phosphorus ore. A fair quantity of American hematite iron has been sold to Italy for October and November shipment. Semi-finished steel is very firm. Finished steel has an upward tendency and there is less and less ability to cope with merchant business. Furnaces in blast are 163 as compared with 159 at this time a year ago. Stocks of pig iron in Connal's stores were 138,409 tons at the close of last week as compared with 139,677 tons one week previous. We quote as follows:

Tin plates, coke 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 17s. 9d. to 18s., as compared with 17s. 6d. last week.

Cleveland pig-iron warrants, 64s. 9½d., against 64s. 7d. a week ago.

No. 3 Cleveland pig iron, maker's price, f.o.b. Middlesbrough, 65s., compared with 64s. 9d. a week ago.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £12, against £11 15s. last week.

Steel ship plates, Scotch, delivered local yards, £10.

Steel rails, export, f.o.b. works port, £8 17s. 6d.

Hematite pig iron, f.o.b. Tees, 102s. 6d. to 105s., against 99s. a week ago.

Sheet bars (Welsh), delivered at works in Swansea Valley, £7 5s.

Steel joists, 15 in., export, f.o.b. Hull or Grimsby, £11.

Steel bars, export, f.o.b. Clyde, £12 5s.

Ferromanganese, f.o.b., £20 15s.

Ferrosilicon, 50 per cent, c.i.f., £19 10s.

American Semi-Finished Steel in Great Britain

Great Britain's imports of blooms, billets and slabs from the United States in August were 44,059 gross tons against 471 tons in August, 1914. For the eight months to Sept. 1, 1915, they were 252,330 tons, compared with only 21,357 tons to Sept. 1, 1914. For the 13 months of the war, from Aug. 1, 1914, to Sept. 1, 1915, total imports from the United States were 261,672 tons, against 24,230 tons for the same period a year previous.

The Castings Company of Canada, Ltd., Montreal, Canada, recently incorporated with a capital stock of $50,000 to manufacture brake shoes, car couplings, etc., will install an electric furnace. A. Ellison is manager and E. C. Foster foundry manager.

Metal Markets

NEW YORK, Oct. 13, 1915.

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York			Lead		Spelter	
Oct.	Lake	Electrolytic	Tin, New York	New York	St. Louis	New York	St. Louis
6	18.00	18.00	32.70	4.50	4.42½	14.25	14.00
7	18.00	18.00	32.50	4.50	4.42½	14.00	13.75
8	18.00	18.00	32.40	4.50	4.42½	13.75	13.50
9	18.00	18.00	.....	4.50	4.42½	13.50	13.25
11	18.00	18.00	32.75	4.50	4.42½	13.25	13.00

Copper is quiet but firm. Tin is dull but stronger. Lead is steady at unchanged prices. Spelter is lower under pressure to sell. Antimony is stronger.

New York

Copper.—Since the large export buying of about two weeks ago the market has flattened out, but the quotations for both Lake and electrolytic have held firmly at 18c. Some of the producers are still asking 18.25c., but there is no difficulty in finding the lower quotation, and that might possibly he shaded ⅛c. The exports up to Oct. 11 totaled 6955 tons. The quotation for spot electrolytic in London has been stationary at £88 for a number of days, the general explanation being that American producers are in control of the metal.

Tin.—The market has been extremely quiet, except on Friday when there was a fair business in spot and nearby deliveries. The one influence now dominating tin is the expectation that England will impose a 10 per cent tax on its exportations, although there has been no official confirmation of any such intention. The board of managers of the New York Metal Exchange met and formally passed a resolution construing the provisions of the New York tin contract in a way that would place upon the purchaser the burden of paying the tax, even where deliveries are made in the future on existing contracts. Should such a duty be imposed it is certain that the large stock of tin now in this country would be quickly taken up, and much more would be imported if there were time prior to the duty becoming operative. No large business is looked for until the question is settled, as consumers will wait. The quotation Monday was 32.75c., yesterday being a holiday. The arrivals up to that day totaled 1575 tons and there was afloat 4150 tons.

Lead.—Except for a moderate amount of export activity, there has been very little doing in lead, although prices continue steady at 4.50c., New York, and 4.42½c., St. Louis. Independent producers are meeting the quotation of the leading interest but in New York, at least, are not underselling. The exports Oct. 1 to 11 totaled 903 tons.

Spelter.—In the absence of interest on the part of consumers the quotations for spelter have eased off steadily. On Monday 13.25c., New York, was asked and 13c., St. Louis, for prompt deliveries. Shipments to the end of the year run all the way down to 11c. The weakness of the market was helped along to a considerable extent by anxiety on the part of holders to find buyers. Another influence lending weakness was a decline on Monday of £3 10s. in London. The exports this month totaled 1945 tons to Oct. 11.

Antimony.—While the demand has not improved, the quotation for Chinese and Japanese is stronger at 28.50c. The blocking of the Panama Canal route, with its consequent holding up of vessels from the Far East, has given the market its additional strength.

Old Metals.—The market is steady. Dealers' selling prices are continued as follows:

	Cents per lb.
Copper, heavy and crucible	16.75 to 17.00
Copper, heavy and wire	16.25 to 16.50
Copper, light and bottoms	14.50 to 15.00
Brass, heavy	11.75 to 12.00
Brass, light	10.00 to 10.25
Heavy machine composition	13.00 to 13.50
No. 1 yellow rod brass turnings	13.00 to 13.50
No. 1 red brass or composition turnings	11.50 to 12.00
Lead, heavy	4.25
Lead, tea	4.00
Zinc scrap	10.50 to 11.00

Chicago

OCT. 11.—Inquiry for copper has been heavy, and sales have been proportionately numerous. The price has remained about stationary, however, which is equally true for the other non-ferrous metals. A stronger situation with respect to tin appears to be developing. We quote: Casting copper, 17.50c.; Lake copper, 18c.; tin, carloads, 33.50c.; small lots, 36c.; lead, 4.40c. to 4.45c.; spelter, nominally, 13.50c.; sheet zinc, nominally, 16c.; Cookson's antimony, 47.50c. to 50c.; other grades, 32c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 14c.; copper bottoms, 12.50c.; copper clips, 13.50c.; red brass, 11.25c.; yellow brass, 10c.; lead pipe, 3.75c.; zinc, 9c.; pewter, No. 1, 18c.; tinfoil, 25c.; block tin pipe, 28c.

St. Louis

OCT. 11.—The past week has been quiet. Lead is quoted to-day at 4.40c. to 4.50c.; spelter, 13.75c to 13.87½c.; tin, 32c.; Lake copper, 18.50c.; electrolytic copper, 18.25c.; Asiatic antimony, 28.50c. In the Joplin ore market prices generally were stronger at $80 to $87.50 per ton, the top settlement reaching $90.50. Calcamine brought $50 to $60, with premium ores as high as $65. Lead ore was unchanged at $50, with premium ores as high as $54. Miscellaneous scrap metals are quoted as follows: Light brass, 6.50c.; heavy yellow brass, 8.50c.; heavy red brass and light copper, 10c.; heavy copper and copper wire, 12c.; zinc, 6.50c.; lead, 3.50c.; pewter, 20c.; tinfoil, 28c.; tea lead, 3.50c.

Iron and Industrial Stocks

NEW YORK, Oct. 13, 1915.

Efforts of banking interests to curb reckless speculation were effective with regard to some stocks, but had no influence whatever on others, and the market of the past few days has been steadily advancing. Some industrial stocks have made new high records. Bethlehem common touched 450. Steel common responded with a jump to the publication of the sharp gain in unfilled orders. The very satisfactory Government report on the condition of crops Oct. 1 stimulated dealings in railroad stocks and also imparted further confidence to operators in industrial stocks. The range of prices on active iron and industrial stocks from Wednesday of last week to Monday of this week (Tuesday being a holiday) was as follows:

Allis-Chal., com.	41¼ - 45½	Ry. Steel Spg., pref.	95 - ..
Allis-Chal., pref.	71½ - 75⅝	Republic, com.	48¼ - 53¾
Am. Can, com.	59 - 64¾	Republic, pref.	100 - 104
Am. Can, pref.	104¼ - 106½	Rumely Co., com.	5 - 6
Am. Car & Fdy., com.	76½ - 86½	Rumely Co., pref.	10 - 11⅝
Am. Car & Fdy., pref.	115 - 117	Sloss, com.	55 - 60½
Am. Loco., com.	59⅜ - 68¾	Sloss, pref.	91 - ..
Am. Loco., pref.	99 - 99¾	Pipe, com.	24½ - 27½
Am. Stl. Fdries.	57½ - 67¾	Pipe, pref.	48 - ..
Bald. Loco., com.	102 - 127½	U. S. Steel, com.	76¾ - 83
Bald. Loco., pref.	107 - 109½	U. S. Steel, pref.	113¾ - 115⅝
Beth. Steel, com.	390 - 450	Va. I. C. & C.	62½ - 67½
Beth. Steel, pref.	155 - 175	West'gh'se Elec.	125 - 138⅝
Colorado Fuel	50½ - 60⅝	Am. Ship, com.	36 - 37⅝
Gen. Electric	173 - 181	Am. Ship, pref.	74¼ - 77
Gt. No. Ore Cert.	44½ - 50¾	Chic. Pneu. Tool	80 - 88
Int. Harv. of N. J., com.	105⅝ - 112¼	Cambria Steel	67 - 70½
Int. Harv. Corp., com.	70 - 71	Lake Sup. Corp.	8½ - 9¾
Lacka. Steel	77¾ - 84¾	Pa. Steel, com.	90 - ..
Nat. En. & Stm., com.	27¾ - 30½	Pa. Steel, pref.	90 - 93
Nat. En. & Stm., pref.	91½ - 91⅞	Warwick	10½ - 10⅝
Pitts. Steel, pref.	98 - ..	Cruc. Steel, com.	79½ - 96⅝
Pressed Stl., com.	65 - 73	Cruc. Stl., pref.	106 - 109½
Pressed Stl., pref.	104 - 104½	Harb.-Walk. Refrac., pref.	99 - ..
Ry. Steel Spg., com.	44½ - 49¾	La Belle Iron, com.	43¾ - 45
		La Belle Iron, pref.	115 - ..

Dividends

The Harbison-Walker Refractories Company, regular quarterly, 1½ per cent on the preferred stock, payable Oct. 20.

The American Rolling Mill Company, regular quarterly, 1 per cent on the common stock and 1½ per cent on the preferred stock, payable Oct. 15.

The International Nickel Company, 10 per cent stock dividend on the common stock and regular quarterly, 1¼ per cent, on the preferred stock, both payable Nov. 1.

STEEL CONSOLIDATIONS

Government's Attitude Watchful, but No Proceedings Expected

WASHINGTON, D. C., Oct. 12, 1915.—The statement issued by the Attorney General on Oct. 7, intimating that the proposed combination of certain independent steel manufacturers would constitute a violation of the Sherman anti-trust law, is regarded by the most experienced observers here as perfunctory rather than as a seriously intended caveat designed to warn the promoters of the projected consolidation of the intention of the department to invoke the law to prevent the consummation of the plan. It can be stated on the highest authority that no action will be taken by the Attorney General beyond closely observing developments until the United States Supreme Court has handed down its decision in the case brought against the United States Steel Corporation upon which the court below has ruled adversely to the Government and which, up to this writing, has not been formally certified to the Supreme Court on appeal. It is expected that this important case will be argued at the new term which began Oct. 11, and as both sides will probably unite in a motion to advance the case for hearing it is believed that a decision will be reached before the close of the term. In his formal statement concerning the proposed combination of the independent steel manufacturers the Attorney General says:

> It cannot be questioned that if it was lawful to unite through the United States Steel Corporation one-half of the competitive units in the steel trade, the other half would also have the right to combine. And, of course, what could be done in the steel trade could be done in every other branch of trade, thus virtually putting an end to competition.
>
> But the decision of the circuit judges of the Third Circuit in the steel case is not yet the established law. It is because of just such consequences that the Government is appealing from that decision. Besides, in the Harvester case a court of equal rank took a very different view of the law.
>
> The question is now pending before the Supreme Court. In the meantime, attempts to combine able and efficient competitors, affecting trade over a wide area, will be subjected to the closest scrutiny by the Department of Justice.

This statement has been carefully analyzed by experienced corporation attorneys here, and the unanimous opinion is expressed that the proposed combination cannot be successfully assailed under the Sherman law. Assuming for the sake of argument that the project now on foot contemplated a combination of all the steel manufacturers not embraced in the United States Steel Corporation, it is conceded that the Department of Justice would have a far stronger case under the Sherman law against such a consolidation than it has against the United States Steel Corporation. In such an event there would be but two competitors, whereas at present the Steel Corporation has a number of powerful independent rivals, who not only compete with the big combination but also strive among themselves for business. So far as future competition would be affected by the proposed consolidation, lawyers here suggest that a combination of three or four of the leading independent manufacturers would result in a strong unit which would be in much better position to compete with the Steel Corporation than is any single manufacturer at present; hence, if consumers are benefited by sharp rivalry, it will be to their interest to have the consolidation effected. W. L. C.

A remarkable record of continuity of service in power plant operation is reported by the Quincy Market Cold Storage & Warehouse Company, Boston. The chief engineer of this company reports that it has had in operation a 500-kw. Westinghouse-Parsons turbine, which has been carrying load continuously for two years and eight months without the steam being turned off at the throttle. A short time ago it was decided to shut down the turbine for inspection. The machine was found in perfect condition, and it was started up at once and put back into service.

Features of Iron and Steel Institute Meeting

One of the interesting features of the ninth meeting of the American Iron and Steel Institute, which will be held in Cleveland, Ohio, Friday and Saturday, Oct. 22 and 23, will be the inspection of the Pennsylvania ore dock, where the operation of unloading iron ore from a large freighter will be witnessed. The members will leave the Hotel Statler in automobiles at 9 a. m., Saturday, and will proceed to the dock. At 10:30 the party will board a special train for the automobile building plant of the White Company, where an opportunity will be afforded to observe the manufacture of motor cars and motor trucks. Next the party will be taken by automobiles to the Country Club, where lunch will be served and the privileges of the golf course will be extended to the visitors. The courtesies of the following clubs also will be extended to the members of the American Iron and Steel Institute during their stay in Cleveland: Union Club, Cleveland Athletic Club, Country Club, Mayfield Golf Club and Shaker Heights Country Club.

Three business sessions of the Institute will be held Friday, Oct. 22, morning, afternoon and evening, at the meeting headquarters, Hotel Statler. The banquet will be in the grand ball room of the Hotel Statler Friday evening. A large number of Cleveland manufacturers have extended invitations to the members for the inspection of their plants and guides will be stationed at the Hotel Statler to direct the members, automobiles being available for making these trips.

Charcoal Furnace Projects in Missouri

Three corporations, all reported to be financed by Eastern and Northern capitalists, have begun operations indicating a revival of iron-ore mining and pig-iron making in southeastern Missouri, in St. Francois and Iron counties, once prominent for their products. The Superior Iron & Furnace Company, St. Louis, has bought a total of 1700 acres of proved iron land, while another buyer, the Radium Iron Company, Chicago, Ill., has acquired 30,000 acres in the same general section, and a third company, the Ozark Iron & Furnace Company, has bought about 400 acres of ore land. All have options on additional acreage and all have plans for the erection and operation of cold blast charcoal furnaces. Each contemplates an output of about 35 tons daily. All are arranging to supply iron ore to other furnaces desiring to make purchases. The No. 1 ore in the southeastern Missouri deposits runs from 55 to 62 per cent in metallic iron. The investments already made in ore land have exceeded in cost the total capitalizations of the three companies, indicating that the companies as formed are simply preliminary in character. Included in the purchase by the Superior Company is the famous Iron Mountain, which supplied an immense quantity of ore in its day to furnaces in and near St. Louis.

The Chinese Government expert, sent to examine the Hanyang Iron & Steel Works, with reference to government ownership, referred to in THE IRON AGE of April 22, 1915, reports that there are forty foreign engineers and 8050 Chinese laborers working there; that the plant can produce 15,000 tons of pig iron per month, 7000 tons of steel rails, besides a considerable output of steel plates and nails.

The rebuilt blast furnace of the Robesonia Iron Company, Ltd., at Robesonia, Pa., was blown in Oct. 8. This stack was blown out last May, since which time it has been rebuilt to conform with the designs of Frank C. Roberts & Co., Philadelphia. The stack was fired by Mrs. W. C. Freeman of Cornwall, Pa., wife of the chairman of the board of directors.

The D. Wilcox Mfg. Company, Mechanicsburg, Pa., has obtained an order for 580,000 drop forgings from the Ford Motor Company, Detroit, Mich., at a cost of $107,000. This is the largest single contract ever obtained by the Wilcox Company.

Settlements with New England Metal Workers

In Some Cities Normal Conditions Are Nearly Restored—But Little Spread of Machine Shop Labor Troubles

Since Sept. 4 operations of the Hendey Machine Company, Torrington, Conn., have been interrupted by demands of employees, about 900 men having gone out. The men at first asked for a 48-hr. week, with 60 hr. pay, 15 per cent increase in wages and time and a half for overtime. The company first offered a 55-hr. week with 55 hr. pay, 10 per cent increase in wages, and time and a quarter for overtime. A second offer raised the increase in wages to 12½ per cent. On Oct. 6 the employees presented revised demands which called for a 50-hr. week, a 35 per cent increase in wages and time and a half for overtime. In a reply of some length, Superintendent W. P. Norton announced that the company had definitely decided that it would run its plant on the basis of its last offer.

A strike of about 100 men at the Birmingham Iron Foundry, Derby, Conn., was settled Oct. 7 on the basis of a 50-hr. week with 55 hr. pay.

About 75 men at the plant of the H. A. Mathews Mfg. Company, Seymour, Conn., struck last week for a 55-hr. week with a 10 per cent increase in wages.

ARBITRATION BOARD AT SPRINGFIELD, MASS.

The employees of the Bosch Magneto Company, Springfield, Mass., on Sept. 20 presented demands which the company answered in a clear-cut and comprehensive document. The company had already granted the 8-hr. day and the main issue appeared to be that the employees claimed that the adjustment of wages to the new schedule had lessened their earnings. No strike has followed the refusal of the company to comply with the demands but a meeting of the men was held on Oct 9 to consider the advisability of inviting the State Board of Conciliation and Arbitration to investigate the employees' claims of diminished earnings. In answer to the demand for the right to present grievances through a shop committee the company showed that the existing system of presenting complaints had proved adequate. Out of 80 complaints since Oct. 21, 1913, the company had accepted 60 as justified..

Following the granting of a 48-hr. week by the Hendee Mfg. Company, Springfield, Mass., dissatisfaction arose which resulted in demands by the employees for a straight 8-hr. day and an increase in piece rates, together with other changes in working conditions. A strike resulted on Sept. 27. An adjustment was effected by the State Board of Conciliation and Arbitration which was ratified by the following agreement:

This agreement, entered into this 5th day of October, 1915, between the Hendee Mfg. Company of Springfield, Mass., known hereafter in this agreement as the "company," and the employees of said company, known hereafter in this agreement as the "employees," to wit:

1. The employees agree to return to their former places of employment and to submit to the Massachusetts State Board of Arbitration and Conciliation the grievance at issue relating to the division of time on the present 48-hour working schedule, both parties to abide by the result of the State Board's decision.

2. Both parties to this agreement agree that there shall be no discrimination or intimidation of employees by either the company or the employees.

3. All individual grievances shall be first taken up with the foreman of the employee and if same are not adjusted within a reasonable time they may be taken up with the company by either the individual or a shop committee through the company's special representative.

4. A collective grievance may be taken up with the company through the special representative direct.

5. Failure on the part of both parties to this agreement to agree, said grievance or grievances shall be submitted to the Massachusetts State Board of Arbitration and Conciliation.

6. The reporting for work of the employee within ten days from the date of this agreement, together with the signatures of the company's representatives, will be considered as knowledge and acceptance of said agreement and putting same into force.

7. This agreement shall take effect from date and continue in effect for two years. Should either party desire a change, a written notice shall be given at least thirty days prior to its expiration. Failing to give said notice, this agreement shall continue in force from year to year.

DIRECT APPLICATION TO GENERAL MANAGER

The Taft-Pierce Mfg. Company, Woonsocket, R. I., has issued a notice to its employees establishing a somewhat novel plan for making application for rate increases. By this plan the superintendent and foremen play no part in suggesting wage increases, as each employee is to make application direct to the general manager. Blanks are provided, to be filled out by "those who are prepared to demonstrate to the satisfaction of the general manager that the quality of service rendered by the applicant is worth more to the company than the rate being paid." It is hoped that this method of direct dealing will bring about better relations between management and employees and promote the interests of both company and employee. While the plan is necessarily experimental and subsequent events may necessitate its abandonment, it is the hope of the officials that the men will make intelligent use of the unusual opportunity to discuss rate increases, which for its success depends upon frank dealing and mutual understanding. The success of this plan will be a matter of interest to all industrial managers who are seeking ways to avoid the labor troubles which have handicapped so many manufacturing establishments in the past few months.

The 8-hr. campaign in Hartford, Conn.. is apparently a failure as several hundred of the 1500 employees of the Pratt & Whitney Company who went out have returned to their machines.

The strikes at New Britain, Conn., are rapidly being settled except in the plant of the New Britain Machine Company, where conditions remain unchanged. Most of the employees of the Corbin Screw Corporation are returning to work. The men in the automatic department voted Oct. 7 to remain on strike but it is believed that they will soon return to work on the same terms as the other employees—an individual settlement of differences. The employees of the Traut & Hine Mfg. Company presented demands but did not go out on strike, accepting the management's assurance that all differences would be settled on a "square deal" basis with individuals. Groups of strikers are returning to the North & Judd Company and the Union Mfg. Company each day and conditions in these plants are fast returning to normal.

Three thousand silver workers in the plants of the International Silver Company and Manning, Bowman & Co., Meriden, Conn., went out Oct. 4 after their demands for an 8-hr. day and wage increases had been refused. The International Silver Company offered a 55-hr. week with 10 per cent increase in wages which was refused by the strikers at a meeting Oct. 9.

Conditions at the Brown & Sharpe Mfg. Company, Providence, R. I., are fast approaching normal, as the men who struck are returning in large numbers. An effort to bring out the employees of the plants of the Builders Iron Foundry met with little success. The agitators are still active.

The Providence Engineering Works, Providence, R. I., gave its employees a 12 per cent bonus, beginning Aug. 1. This did not appear to satisfy its men, and on Oct. 8 it announced that as soon as men could be secured it would go on a three-shift, eight-hour schedule. The company recently withdrew from the National Metal Trades Association, in anticipation of the change of schedule. The bonus payments are with-

drawn under the new arrangement. The plant is busy on munition contracts.

NORTON GRINDING COMPANY PLEDGE

When the employees of the Norton Grinding Company, Worcester, Mass., came to work on Saturday morning, Oct. 9, they found all the doors but one locked. Each man as he entered this door was informed that the plant would resume operations Monday morning and if he desired to work at that time he could do so by signing a card bearing this statement:

I hereby promise to be at work on my present job on Monday morning, Oct. 11, 1915. I will not go on strike or knowingly do anything contrary to the best interests of the Norton Grinding Company.

Many of the men promptly signed and when the plant opened on Monday morning over 250 employees were on hand ready to work. The other men took out their tools. About 550 hands are regularly employed. Those who signed the cards will be paid for Saturday forenoon, as the officials of the company state that their action does not constitute a lockout. The strike leaders state that action in regard to a strike, which was to have been taken Friday evening, was deferred at the request of the State Board of Conciliation and Arbitration. The State Board has ordered a public investigation of the labor troubles in Worcester. The first hearing was appointed for Wednesday, Oct. 13. This is the only change in industrial conditions in Worcester within the week.

Pittsburgh and Nearby Districts

The annual report of the Westinghouse Air Brake Company, Wilmerding, Pa., states that owing to the crippled financial condition of the railroads and the general business depression that followed the start of the European war, sales of airbrakes and other equipment by the company were only 62 per cent of the average net sales per annum for the previous five fiscal years. Referring to the war-order business taken the report says: "During the month of April, 1915, the company accepted orders for 18-lb. shrapnel, complete, except propellant powder, and additional cartridge cases, amounting in total to $17,930,000. While the terms are favorable, with ample guarantees against contingencies, these orders have necessitated a heavy expenditure for special machinery and for its installation in temporary, though substantial, buildings, to the end that the maximum output of the company's regular product might not be affected in case of a sudden revival of the railroad-supply business. It is expected that when the value of this special machinery and the buildings not available for future use shall have been charged off, the net result will represent a substantial but not an unusual manufacturing profit on the amount involved."

The United Engineering & Foundry Company, Pittsburgh, is operating all of its plants—located in Pittsburgh, Youngstown and Canton, Ohio—to full capacity. It has recently secured large orders for steel-works and other equipment. It is building lap and butt weld pipe furnaces for the Jones & Laughlin Steel Company's works at Aliquippa, Pa., and pipe-mill furnaces for the Republic Iron & Steel Company, Youngstown.

An item published on page 778 of THE IRON AGE of Sept. 30 made an error in the name of the Glass Brick Company, Huntington, W. Va. It was printed Gas Brick Company. The general offices of this company are in the First National Bank Building, Cincinnati, Ohio.

The Youngstown Iron & Steel Company, Youngstown, Ohio, has started another open-hearth furnace in its new steel plant, and all three furnaces are now in operation. The company is now using from 200 to 250 tons of hot metal per day from Mary furnace of the Ohio Iron & Steel Company at Lowellville, which is transported in ladles over a special track, and in addition is using a large amount of heavy steel scrap.

The Fawcus Machine Company, Pittsburgh, maker of cut gears and special machinery, will increase its capital from $200,000 to $500,000. Thomas Fawcus, president, states that the increase will be used for making large additions to the plant and that much of the machinery to be installed has already been purchased.

The report that the Pittsburgh Steel Company had called nearly all its traveling men in on account of excessive orders on its books, and not needing their services, is incorrect. The company is making some rearrangements of traveling territories of its men, and this probably gave rise to the report.

The Youngstown Sheet & Tube Company, Youngstown, Ohio, has placed contracts for the coal-handling machinery necessary in the operation of its new battery of 204 by-product coke ovens, which will be completed about April 1, 1916. A high-lift car dumper, by which coal is raised in the railroad cars in which it arrives to a position above the ovens and dumped into bins for washing and crushing, was given to the Wellman-Seaver-Morgan Company, Cleveland. The remainder of the machinery, including the conveyor system for distributing the coal from the washer to the ovens, was placed with Fairbanks, Morse & Co., Chicago.

Chester & Fleming, engineers, Pittsburgh, are preparing detailed plans and specifications for a waterworks plant for East Youngstown, Ohio, which will involve a complete distributing system, force main, pumping station, filtration beds and standpipe.

The Youngstown Car Mfg. Company, Youngstown, Ohio, of which William Wilkoff is president, contemplates making some large additions to its plant so as to be able to handle some of the large car orders which are expected to be placed by the railroads within a short time. This company had been making narrow gage cars only, but it contemplates building standard gage cars.

The West Penn Traction Company will spend about $1,000,000 in the installation of a complete power unit of a capacity of 19,000 kw. at its plant in Connellsville, Pa. Contracts for most of the equipment have been placed.

The Standard Chain Company, Pittsburgh, has recently made large additions to its chain works at York, Pa. These include the erection of a one-story steel frame building which covers an area of about 9000 sq. ft. A modern office building has also been erected. No additional machinery will be required, as the new building will simply relieve congestion in the placing of equipment in the present building.

The Pennsylvania Tank Car Company, Sharon, Pa., will make large additions to its plant which will about double its capacity for the manufacture of tank cars. These will include a new steel building, 36 x 280 ft., in which will be installed modern equipment, among which is a Hilles & Jones punching machine, capable of punching 1¼-in. holes in 1½-in. plates. When the new additions are completed the company expects to turn out 12 to 15 cars per day.

No. 8 open-hearth furnace of the Brier Hill Steel Company, Youngstown, Ohio, is nearly completed and is expected to be making steel by Oct. 15. The company will then have an output of close to 1200 tons of open-hearth steel per day.

The Federal Radiator Company, New Castle, Pa., has increased its capital stock to $150,000 and will make some large additions to its plant.

The Railway Supply & Equipment Company, Pittsburgh, has been incorporated to conduct a general foundry, casting and machine business in all kinds of metals by Kate G. Small, A. D. Starrett and W. A. McCoy, all of Pittsburgh.

The Driggs-Seabury Ordnance Company, Sharon, Pa., is making large additions to its plant and adding considerable new equipment in order to start the manufacture of high explosive shells and shrapnel. The company is said to have orders for war munitions amounting to about $15,000,000 besides large orders for automobile parts. Practically the entire output of the plant in shrapnel and high explosive shells will be shipped to England and Italy. In a short time the company will have 1500 or more men on its payroll.

CORRESPONDENCE

What Is Vanadium Steel?--Testimony in Recent Litigation

To the Editor:—Some time ago a concern in which the writer is interested placed an order with a steel foundry located something less than 100 miles from Chicago for the following:

> Six tray lips, pattern A-1044. . . . These lips are to be of *vanadium* cast steel, 0.35 to 0.45 per cent carbon, *annealed*. . . . Care should be taken that the metal in the cutting edges is solid and of the best quality. . . .

These castings were shipped direct to a coal dock where they were to be used. Some of them broke within a few hours and all within a comparatively short time after being put in service. They did not give as much service as some ordinary open-hearth steel tray lips which had previously been used. Payment of the bills was refused and the steel foundry brought suit, in which the following testimony was developed:

The superintendent of the steel foundry testified that 6½ lb. of vanadium (alloy about one-third pure) was put in each pot of 1600 lb. of steel, which would amount to 0.15 to 0.16 per cent (calculation shows 0.1354 per cent). In reply to a question regarding standard vanadium steel he stated that the vanadium *put in* castings varies from 0.05 to 0.15 per cent, sometimes higher if it is ordered higher; also that the amount of ferrovanadium lost in the melt varies a good deal with the temperature of the steel, from *nothing up to one-half of one per cent.* A chemist testifying for the defendant stated that he found the vanadium content of the castings to be 0.03 and 0.04 per cent; the carbon content was 0.375 and 0.384 per cent.

A metallurgist of twenty-eight years' active experience, the last six years devoted especially to vanadium alloys, testifying for the defendant, stated that the addition of 6½ lb. of ferrovanadium (33 1/3 per cent vanadium) to 1600 lb. of steel, would be equivalent to about 0.14 per cent vanadium, and that there would be at least 20 per cent and possibly 30 per cent of that lost. The result would be about 0.10 per cent of vanadium remaining in the steel. He stated further that there is a recognized standard vanadium steel—not less than 0.15 per cent of vanadium and that castings containing only 0.03 and 0.04 per cent would not be castings of standard vanadium steel, and that the two castings, defendant's exhibits 1 and 2, showed numerous gas cavities and blowholes.

Three other witnesses testifying for the defendant stated that after the castings were broken they observed numerous holes, variously designated by them as air holes, blowholes, sand holes, etc., and specified various sizes up to an inch, a little larger or a little smaller.

The attorney for the plaintiff stated verbally, "When you specified vanadium as you did in the contract, you left it entirely to us, to our judgment, as to the amount of vanadium to be put in them," and, in his brief he stated, "We submit that, if there is a 'standard,' under the contract the plaintiff was not required to furnish it, and that if he was required to do so he did furnish steel substantially complying with the alleged standard specifications as disclosed by the record." (R. W. Hunt & Co.'s analysis as testified to above showed vanadium 0.03 to 0.04 per cent).

Encyclopaedia Brit., Vol. 14, Page 812, says: "Vanadium in small quantities, 0.15 or 0.20 per cent, is said to improve steel greatly, especially in increasing its resistance to shock and to oft-repeated stresses."

Notwithstanding the above testimony as to vanadium content and the defects in castings, a decision was given for the plaintiff.

The question which now comes up and which interests all purchasers of steel castings of special alloy, or otherwise, is: "Is there a standard vanadium steel casting, and to what extent must full and complete specifications, chemical as well as physical, be given in a simple order when not covered by a term contract in which these elements are covered?" Let the steel foundries come forward and declare themselves. Would all of them make the claim put forward by the attorney for the plaintiff in the above case, and would they, under the circumstances, claim that these were merchantable castings? What is the opinion of the trade on this subject?

D. J. EVANS.

Chicago, Oct. 1, 1915.

The Regenerative Furnace in the Iron Foundry

To the Editor:—In your issue of Sept. 23 Mr. Slocum ably outlines some decided improvements in the production of chilled cast-iron car wheels and as an adjunct to them recommends the use of the air furnace as a substitute for a cupola as a melting device, setting forth as advantages of the former that it gives a greater control of the composition of a charge of molten metal and greater certainty of uniformity in numerous desirable particulars. All of these are recognized facts.

May I suggest that instead of using an air furnace a regenerative open-hearth furnace be employed, principally in the interest of substantial economies. All the advantages of the air furnace are retained, in respect to control of composition, etc., with the added difference that the open-hearth will not only melt a given quantity of cast iron in less time than an air furnace and offer greater niceties in the regulation of temperature, but it will use less fuel in the operation. That is to say, a pound of bituminous coal gasified in a producer will melt more pounds of iron when used as a fuel in an open-hearth furnace than will a pound of coal burnt on the grate of an air furnace. The thermal efficiency of a direct fired reverberatory furnace is approximately 10 per cent while the regeneratively fired open-hearth furnace shows between 50 and 55 per cent.

It will not be extravagant to urge upon other branches of the gray iron foundry industry the advantages of an open-hearth as a substitute for the cupola, because in certain localities a gas producer will show a greater saving in fuel expenditure over the cost of coke. Furthermore, the quality of the castings will be decidedly improved and the difficulty encountered by the absorption of sulphur by iron melted in contact with coke will be practically eliminated. In some localities the fuel of the open-hearth may be liquid (oil or tar), retort coke oven gas, or natural gas.

The writer does not offer these suggestions as mere hypothetical considerations but rather as based upon practical experience. The matter offers a really inviting and profitable field for investigation to the gray iron foundries, particularly where they may be subjected to excessive haulage charges for coke.

Erie, Pa., Oct. 7, 1915. W. M. CARR.

Pacific Federation of Employers

The first annual convention of the Pacific Federation of Employers will be held in San Francisco Oct. 26 and 27. The subjects to be discussed include the following:

Boycotting, picketing, publicity.
Strikes.
Political activity of organized labor.
Necessity of organization for protection.
Legislation.
Labor publication—general policy and who supports them.
Bonding members of employers' associations to deal fairly with their employees.
Discrimination—freight rates.
Minimum wage.

The rush of ore shipments from the Lake Superior district promises to establish new production records from some of the open pit mines, which lend themselves readily to sudden increase of output. The Hull-Rust pit has been one of the largest producers on the Mesaba range during the past several years, but its estimated output of 4,000,000 tons for the present season will exceed any previous record.

New Van Dorn Factories

The Van Dorn & Dutton Company and the Van Dorn Electric Tool Company, Cleveland, Ohio, have acquired a four-acre site on Woodhill Road, between Kinsman and Buckeye Roads, on which they will shortly begin the erection of new plants that will more than double the capacity of their present factories. The new plant of the Van Dorn & Dutton Company will be 50 x 390 ft., two stories high on the street level. The building site is on sloping ground, the contour of which will permit the erection of a third story the greater part of the length of the building and a fourth story at the back end, making a four-story plant in the rear and providing 70,000 sq. ft. of floor space. The plant of the Van Dorn Electric Tool Company will be a two-story building, 50 x 275 ft., providing 35,000 sq. ft. of floor space. The buildings will be of concrete and steel construction and have a large amount of glass surface. It is the intention to make both plants as thoroughly up to date as possible.

The two buildings will be joined across the front by a two-story office building, 50 x 110 ft. The office building will have one main entrance, and half of the structure will be occupied by each company. The erection of adjoining plants on one site, with one office building, was considered a desirable plan in the case of these two companies, as the personnel of their management is largely common.

In addition to the main buildings a thoroughly equipped steel hardening and heat-treating plant 50 x 60 ft. will be erected. Considerable new machinery equipment will be acquired by both companies, and one additional crane will be installed. The buildings are so laid out that ample space is provided for future extensions. The factories of the two companies are inadequate in capacity to meet the demands of the trade. Both are being operated night and day at present, the plant of the Van Dorn & Dutton Company on its line of gears and that of the Van Dorn Electric Tool Company on its line of portable electric tools. It is the intention to rush work so that the new buildings may be occupied about Jan. 1. Ample railroad facilities are provided by a switch from the Cleveland Belt Line Railroad extending along a loading platform at the rear of the buildings, the full width of the property.

Meeting of Chilled Iron Wheel Makers

The Association of Manufacturers of Chilled Iron Wheels held its annual meeting at the Waldorf-Astoria, New York, Oct. 12. The president, George W. Lyndon, presented his report which discussed the present position of the chilled cast-iron wheel and referred to the matters which had been discussed in the year between representatives of the association and representatives of railroad organizations. He referred to the fact that the association now had over 500,000 special flange wheels in use, the flange being 3/32-in. thicker than the M. C. B. flange. Ultimately the plans of the association look to the design of a chilled iron wheel of 950 lb. or heavier. The report also suggested five comparative tests for chilled iron wheels and steel wheels, which he believed would result in establishing the chilled wheel on a better basis.

Philadelphia Foundrymen's Association

There was a large and representative gathering of local and out-of-town foundrymen at the two hundred and fifty-first regular meeting of the Philadelphia Foundrymen's Association, held at the Manufacturers' Club in that city Wednesday evening, Oct. 6. The meeting was given up to a discussion of various exhibits at the Atlantic City convention of the American Foundrymen's Association and the Foundry & Machine Exhibition Company, which the Philadelphia association attended on Thursday, Sept. 30. A delegation of 200 had made the trip by special train on the Philadelphia & Reading Railway in charge of Howard Evans, secretary, and A. A. Miller.

J. S. Hibbs of the J. W. Paxson Company led the discussion, giving a general review of the exhibits and of the opinions of those in attendance as he gathered them. The various molding machine, sand blast and melting furnace exhibits (particularly the electric furnace) were discussed at length. Among those participating were L. W. Williams, Pulaski Iron Company; August Williams, Enterprise Mfg. Company; Theodore Rebman, T. C. Dunning, Chester Steel Castings Company; Thomas Devlin, Devlin Mfg. Company; Howard Evans, J. W. Paxson Company, and A. A. Miller. The comment on the new devices shown followed in the main the review of the new features developed in the past year, as given in THE IRON AGE of Oct. 7.

It was reported by the secretary that J. Howard Sheeler, member of the association, had won the silver cup, played for by members of the American Foundrymen's Association, on the Atlantic City golf links.

Chilean Iron Ore Held Up at Panama

A considerable number of cargoes of Chilean iron ore from the Bethlehem Steel Company's Tofo mines have been held up by the slide in the Culebra cut of the Panama Canal. Heavy losses to the vessel owners have already resulted from the long holdup. The jettisoning of some of these ore cargoes has even been considered as a cheaper way out of the difficulty than to attempt to bring the ore around South America through Magellan Strait. If the ore were thrown into the ocean the vessels would be free to enter Pacific Coast trade, as the blockade of the canal is now expected to last for several months.

Advance for San Francisco Machinists

An increase in wages of machinists, an eight-hr. day, and the settlement of labor disputes through arbitration are provided for in a new agreement entered into between the Iron Trades Council and the California Metal Trades Association at San Francisco which will continue in force for a period of two years. It is understood that machinists will receive an increase of 25 cents a day, making the minimum wage $3.75 per day. On Dec. 13 another increase of 25 cents a day is to go into effect.

The announcement is made that the Trumbull Steel Company, Warren, Ohio, will install eight additional sheet mills and bring the total number up to 32, increasing the annual capacity of the plant to 175,000 tons. The company recently authorized the increase of its capital stock by an additional issue of $750,000 in preferred stock and a similar amount of common stock.

It is announced that Ryolite has been selected as the best among many names submitted to Joseph T. Ryerson & Son, Chicago, for the tool steel marketed by that company. The first prize of $100 offered by the company for this name was divided between Robert H. M. McNeilly, Nashville, Tenn., and P. R. Kohlsdorf, Milwaukee, both of whom submitted the word ryolite.

The American Steel Foundries, Chicago, is reported to be concluding negotiations for a war order involving something in excess of $20,000,000, following a trip of the company's first and fourth vice-presidents to England. Domestic business has been decidedly revived very lately and the third quarter's figures are expected to show a fair profit.

George W. Niedringhouse, general manager of the National Enameling & Stamping Company, Granite City, Ill., announces that the company's local operating force was increased 25 per cent last week to 2500. The company is confronted with a large amount of work which will command the maximum output of the plant.

The Cincinnati, Indianapolis & Western is asking for bids on 46 locomotives of various types. The Chicago Junction has ordered two locomotives from the American Locomotive Company.

CARNEGIE PROMOTIONS

New General Superintendent and Assistant General Superintendent at Duquesne

Edward J. Hamilton, who was appointed general superintendent of the Duquesne steel works of the Carnegie Steel Company last week, was born in Johnstown, Pa., Sept. 16, 1867. He attended the public schools in Johnstown, and entered the employ of the Gautier works of the Cambria Steel Company in 1887, later taking a position with the Lorain Steel Company of Johnstown, and was in the employ of that company at the time of the great Johnstown flood in 1889. After leaving Johnstown he secured a position at the Edgar Thomson blast furnaces of the Carnegie Steel Company at Bessemer, Pa., and on July 15, 1892, was transferred to the Homestead steel works. He remained there until April 1, 1899, and then went to the Duquesne steel works as inspector of machinery. In 1900 he was promoted to the position of assistant to the general superintendent and on June 1, 1901, was made assistant general superintendent. Mr. Hamilton is vice-president of the Duquesne Trust Company and also vice-president of the board of trustees of the Carnegie Library at Duquesne.

EDWARD J. HAMILTON

AMBROSE N. DIEHL

Ambrose N. Diehl, who was appointed assistant general superintendent of the Duquesne steel works last week, to succeed Edward J. Hamilton, was born in York, Pa., Oct. 20, 1876. From the public schools of that city he went to the York Collegiate Institute, from which he graduated in 1894. In the autumn of that year he entered Pennsylvania State College and graduated as a chemist in 1898. In order to obtain a practical knowledge of chemistry, Mr. Diehl entered the Pennsylvania Experiment Station in 1898. In 1899 he went to the Duquesne steel works of the Carnegie Steel Company and was employed in the laboratory. The next year he was appointed assistant superintendent of the Duquesne blast furnaces and in 1901 was made blast furnace superintendent. Mr. Diehl has contributed articles to the technical press and has furnished several valuable contributions to the proceedings of the American Iron and Steel Institute. He is a member of the American Society of Mechanical Engineers, the American Iron and Steel Institute and the Engineers' Society of Western Pennsylvania.

PERSONAL

James A. Campbell, president Youngstown Sheet & Tube Company, Youngstown, Ohio, has returned from a two weeks' vacation spent partly in the Lake Superior ore regions.

Dr. D. S. Jacobus, advisory engineer of the Babcock & Wilcox Company and special lecturer in experimental engineering, Stevens Institute of Technology, has been nominated for president next year of the American Society of Mechanical Engineers. The nominations for the three vice-presidents to be elected are William B. Jackson, D. C. & William B. Jackson, engineers, Chicago; J. Sellers Bancroft, general manager, Lanston Monotype Machine Company, Philadelphia, and Julian Kennedy, consulting engineer, Pittsburgh. Nominations for the three managers are John H. Barr, consulting engineer of the Remington Typewriter Company, New York; John A. Stevens, consulting engineer, Lowell, Mass., and H. de B. Parsons, consulting engineer, New York. William H. Wiley has been re-nominated for treasurer.

C. R. Cady, formerly with the Celfor Tool Company, Buchanan, Mich., has joined the staff of Smith, Hinchman & Grylls, industrial engineers, Detroit.

William Whigham, who was made vice-president of the Carnegie Steel Company last week, was for some years assistant to A. C. Dinkey, former president of the company. He was born in Pittsburgh in 1866 and was graduated from the Stevens Institute in 1888. He entered the employ of Thomas Carlin & Sons, Pittsburgh, as a draftsman, and some time afterward went to the Carnegie Company as an engineer in the armor plate department. In 1895 he was sent to Russia in connection with armor plate contracts, and in 1899 he became engineer in the Homestead steel works. In 1901 he was appointed superintendent of the Howard Axle Works and in 1905 he was appointed assistant to the president of the Carnegie Company.

William J. Sweetser, assistant professor of mechanical engineering at the Case School of Applied Science, Cleveland, has been appointed professor of mechanical engineering at the University of Maine, Orono, Me.

Hobart P. Swanton has resigned as vice-president of

the George W. Brownyard Company, Rochester, N. Y., and has been elected treasurer of the company.

Emile J. Bayle has been made production manager of the Aluminum Castings Company's Detroit plant.

Robert Allen has been appointed by the Burd High Compression Ring Company, Rockford, Ill., as district branch manager for northern California, with office at 847 Phelan Building, San Francisco. He was formerly attached to the Dallas, Tex., office.

James A. Hall has been appointed assistant professor of mechanical engineering at Brown University, Providence, R. I.

Dudley Shoemaker, vice-president and general manager of the Atlantic Steel Castings Company, which purchased the plant of the Keystone Steel Castings Company, Chester, Pa., is preparing it for operation. He was formerly works manager at the Chicago plant of the American Steel Foundries.

Arthur F. Murray has been appointed an equipment engineer of the Blake & Knowles Steam Pump Works, East Cambridge, Mass.

E. M. Chace, formerly works manager of the Cincinnati Milling Machine Company, Oakley, Cincinnati, Ohio, has resigned to engage in business as industrial engineer with offices in suite 1215-16 Mercantile Library Building, Cincinnati. He will make a specialty of machine shop, power plant and foundry construction, equipment and management.

William T. Clark, manufacturing engineer, Enterprise Mfg. Company, Philadelphia, has been appointed general manager of the Automatic Machine Products Company, Brooklyn, N. Y.

George I. King, son of Arthur King, president Middletown Car Company, Middletown, Pa., has sailed for Russia to represent the Eastern Car Company of Nova Scotia.

James O. Covan and Fred Carley, both of Middletown, Pa., have been sent to France to superintend the assembling of a large order for steel cars now being erected by the Middletown Car Company for the Serbian Government.

E. St. Elmo Lewis has resigned as vice-president and general manager of the Art Metal Construction Company, Jamestown, N. Y.

Burt D. Thompson, recently foreman of the machine shop of the National Twist Drill & Tool Company, Detroit, has been engaged as production manager of the Curtiss Motor Company, Hammondsport, N. Y.

Theodore P. Haughey, field manager, and Edgar Nash Friend, engineer, of the American-Oriental Engineering & Construction Company, 68 Devonshire Street, Boston, Mass., recently sailed for the Orient. This company is the exclusive agent in the Far East for the Youngstown Sheet & Tube Company, M. S. Little Mfg. Company, Stanley G. Flagg & Co., Penn Hardware Company, Pressed Metal Radiator Company, Hubbard & Co., Camden Pottery Company and Standard Sanitary Mfg. Company. It will add other men to its present staff in the Far East at the first opportunity for transportation.

At the recent annual meeting of the stockholders of the Lake Superior Corporation, held in Camden, N. J., Harvey T. Underhill and A. H. Chitty were elected directors to succeed Charles B. Gordon and J. Frater Taylor. The remaining present directors were re-elected. Following the meeting the board organized by electing W. E. Stavert president, to succeed Thomas Gibson, who continues as general counsel. The board re-elected W. C. Franz and H. Cappell vice-presidents, and James Hawson a vice-president to succeed J. F. Taylor. Other officers were re-elected.

Arthur W. Underwood, who has been connected for some time with the sales department of the Domhoff & Joyce Company, Cincinnati, Ohio, has been appointed manager of its St. Louis office, and assumed his new position Oct. 1.

C. H. Johnson, manager of European sales and director of the Gisholt Machine Company, Madison, Wis., returned to New York Oct. 8 after a stay of about six months in Russia. He will go back to Petrograd after a short visit here.

A. Greiner, managing director of the Cockerill Works, Seraing, Belgium, who is president of the Iron and Steel Institute, was reported at the meeting of the Institute in London, Sept. 23, to be seriously ill of enteric fever.

President E. A. S. Clarke of the Lackawanna Steel Company, who has been absent from his office for four or five months because of illness, again took up his duties this week.

Albert R. Riggs has resigned as chief engineer of the Bellefontaine Bridge & Steel Company, Bellefontaine, Ohio, and has purchased with other a plant at Hackettstown, N. J., for the manufacture of steam heating apparatus.

H. G. Saylor continues as private secretary to Homer D. Williams, now president of the Carnegie Steel Company. J. R. Cox also continues as private secretary to Edward J. Hamilton, now general superintendent of the company's Duquesne steel works.

Harry M. Stewart, for eight years assistant superintendent of the Duquesne blast furnaces of the Carnegie Steel Company, has been appointed general superintendent of the blast furnaces, to succeed A. N. Diehl, now assistant superintendent of the Duquesne steel works. Mr. Stewart was graduated from Pennsylvania State College as mining engineer in 1896.

N. V. Sachs, for many years advertising manager, has been promoted to a more responsible position and is now in charge of sales of Jas. H. Matthews & Co., Pittsburgh, manufacturers of employees' time and pay checks.

OBITUARY

ALEXANDRE TROPENAS, inventor of the Tropenas converter, who died at Lyons, France, July 14, aged 55 years, served early in his career as a foreman in the plant of the French Brugès firm where he operated the Robert converter. Later he went to England to superintend the operation of the same converter for Edgar Allan & Co., Ltd. While there he invented his own converter, which he patented both in Great Britain and the United States. About 1901 he came to this country to introduce his process for making small steel castings. The secret of his unusual success in this field here consisted in his recognition of the fact that to introduce a converter properly it is necessary to teach and watch its operation.

JOHN LOYD, president John Loyd Company, 558 Water Street, one of the oldest hardware and machinery houses in New York City, died Oct. 5 at his home in Brooklyn, aged 80 years. He was born in Newton, Mass., and when the Civil War began entered the navy as a third assistant engineer, serving in a number of engagements.

AXEL SAMUEL BERQUIST, a civil engineer and inventor, died Oct. 6 at his home in Brooklyn, aged 52 years. He was a native of Sweden. In 1898 he invented the suspension coal bunkers which have since been installed on many railroads in this country and abroad.

WALTER A. WOOD, JR., a director of the Walter A. Wood Mowing & Reaping Machine Company, Hoosick Falls, N. Y., died Oct. 8, aged 60 years. He was active in politics, had held numerous offices, and at the time of his death was a State Senator.

WILLIAM G. MENDINHALL, who for many years was was an iron broker in Philadelphia, retiring several years ago, died suddenly Oct. 4 at his home in Wilmington, Del. At one time he was interested in a rolling mill at Lancaster, Pa.

Worth Brothers and Remington Arms

Additional Absorptions by the Midvale Steel & Ordnance Company—Carnegie Partners Head the New Organization

Further announcements have been made in the past week of property acquisitions by the newly organized Midvale Steel & Ordnance Company, indicating that munitions manufacture is the main aim of the move immediately, while provision has been made for profitable operation in staple lines of production in times of peace. The company, which was incorporated in Delaware, as stated in these columns last week, with a capital of $100,000,000, is a holding company. Concerning the companies taken over the following was given out by W. E. Corey at New York, Wednesday evening, Oct. 6:

"The Midvale Steel & Ordnance Company, organized in Delaware, with an authorized capital stock of $100,000,000, divided into 2,000,000 shares of only one class of the par value of $50 each, to-day concluded a contract for the purchase of all of the capital stock of the Worth Brothers Company, a Pennsylvania corporation, and for all the property and business of the Pennsylvania co-partnership trading as the Coatesville Rolling Mill Company; also for somewhat more than 98 per cent of the capital stock of the Midvale Steel Company of Pennsylvania, and for all of the capital stock of the Remington Arms Company of Delaware, which last-named concern has contracted to manufacture 2,000,000 Enfield rifles for the British Government. The company has also under option 300,000,000 tons of iron ore. To acquire the above-named stock and property and provide working capital, $70,000,000 of the capital stock of the Midvale Steel & Ordnance Company will be issued.

"Neither the Midvale Steel & Ordnance Company nor the three companies and firm whose capital stocks and properties it is acquiring have any debts other than current, and no bonds or mortgages or preferred stock outstanding, and the aggregate working capital of the parent company and its subsidiaries will be in excess of $15,000,000. The money necessary to carry through the transaction has been privately subscribed at par for the stock.

"The following are the directors and officers of the Midvale Steel & Ordnance Company:

"Directors—William E. Corey, Albert H. Wiggin, Samuel F. Pryor, Ambrose Monell, Frank A. Vanderlip, Alva C. Dinkey, Samuel M. Vauclain, William P. Barba, Percy A. Rockefeller, Charles H. Sabin, Marcellus Hartley Dodge and Frederic W. Allen.

"Officers—President, W. E. Corey; vice-president, A. C. Dinkey; secretary and treasurer, William B. Dickson."

Of special interest to the steel trade is the information conveyed by the above that William B. Dickson, who resigned as vice-president of the United States Steel Corporation in 1911, is to be actively associated with W. E. Corey and A. C. Dinkey in the new Midvale enterprise. All were partners in the Carnegie Steel Company prior to 1901. Their association in a corporation controlling two important steel plants suggests the possible connection later of other Carnegie men in various positions.

Of the directors of the Midvale Steel & Ordnance Company, Mr. Wiggin is president of the Chase National Bank; Mr. Pryor is vice-president of the Remington Arms & Ammunition Company; Mr. Monell is president of the International Nickel Company, and was formerly at the head of the open-hearth department of the Homestead Steel Works where he developed a continuous process which bore his name; Mr. Vanderlip is president of the National City Bank; Mr. Vauclain is vice-president of the Baldwin Locomotive Works; Mr. Barba is also a Baldwin vice-president and is manager of the Midvale Steel Company; Mr. Rockefeller is a member of several bank and railroad boards; Mr. Sabin is president of the Guaranty Trust Company; Mr. Dodge is president of the Remington Arms & Ammunition Company, and Mr. Allen is a member of Lee, Higginson & Co., New York, bankers.

THE WORTH PLANT

The acquisition of Worth Brothers Company by the new Midvale corporation has been discussed with interest by the steel trade. The Worth Brothers Company was organized under the laws of Pennsylvania in 1896 with a capital stock of $250,000. Previously the various Worth properties had been operated under their original names, as Brandywine Rolling Mills, Valley Iron Works and Viaduct Iron Works. The Worth Brothers had developed from small beginnings an important plate mill operation. W. P. Worth, secretary and treasurer of the company, was better known in the steel trade than his brother, the president. The mechanical genius of J. Sharpless Worth was responsible for important improvements in the Worth mills, which at the present time consist of a 90-in., two 132-in. and one 152-in. plate mills with accessory plant. The open-hearth furnaces consist of one acid furnace of 40 tons capacity and five 40-ton and nine 50-ton basic furnaces. The connected co-partnership, the Coatesville Rolling Mill Company, operates the Viaduct Iron Works, whose product was boiler tube skelp and iron and steel plates and sheets, also the Viaduct Forge and the Viaduct Tube Works. The forge was built in 1898 and consists of 26 charcoal fires and three steam hammers, the product being blooms used by the Viaduct Tube Works in the manufacture of charcoal boiler tubes. The capacity of the tube works is 25,000 tons a year, in sizes from 1¼ in. to 8 in. The plate mills have a capacity of 300,000 tons a year of plates for locomotive firebox and boiler, marine and stationary boiler, and tank and structural work. In 1910 Worth Brothers Company built two modern 500-ton blast furnaces and one of these has been in operation for a number of years. For only a short interval in that period have both furnaces been operated at one time. Of late a considerable stock of pig iron has been accumulated amounting to upward of 60,000 tons. The blast furnace capacity thus secured will take care of all the pig iron requirements of the Midvale Steel Company in addition to those of the open-hearth furnaces at Coatesville.

No details have been given out as yet concerning the ore properties which may be acquired to serve the Coatesville blast furnaces. Heretofore the Worth Brothers' ore supply has been bought in the open market—foreign ore, Eastern ore and Lake Superior ore. The statement that the new Midvale interests have Cuban iron ores under option is made in one financial paper, which appears to have good information. A friendly account of the working up of the Midvale combination, which appears in the Boston News Bureau, represents that the Midvale properties were turned over to the new owners at $22,000,000. In the case of the Worth Brothers purchase the same article states that the plant inventory is $13,000,000; that in addition there was a net working capital in cash, inventories and bills receivable of $6,500,000; also that the purchase price was $18,500,000 cash. The Cuban ores said to be under option are reported to carry 1½ per cent nickel.

The Remington Arms Company of Delaware is the company which has leased a number of buildings at Eddystone, Pa., built by the Baldwin Locomotive Works, and will manufacture there military rifles for export. While its principal officers have been the same it is entirely distinct from the Remington Arms & Ammunition Company, operating plants at Ilion, N. Y., and Bridgeport, Conn.

The Midvale Steel & Ordnance Company is expected to acquire other property. A shipbuilding connection has been considered a probability. The company's main offices are in New York, the entire 29th floor of the Bankers' Trust Company Building at 16 Wall Street having been taken, apart from the offices of E. C. Converse. The offices of A. C. Dinkey, who will be in charge of operations, will be at Philadelphia.

EQUIPPING FOR MUNITION WORK

Way May Open for Government Co-operation with Manufacturers

WASHINGTON, D. C., Oct. 12, 1915.—Serious attention is being given by the officials of the War Department to the problems presented by the recent canvass of the iron, steel and metal trades undertaken to determine the capacity of these establishments for the production of war material in an emergency. The policy of the War Department with respect to the encouragement of manufacturers who have not heretofore received contracts from the Government was fully detailed in this correspondence three weeks ago. The officials have regretted their inability to hold out more encouragement, especially in view of the fine patriotic spirit that has been displayed by manufacturers everywhere. The chief stumbling block appears to be the ruling of the Secretary of War that the policy of strict neutrality requires the ordnance experts to refrain carefully from furnishing any information to manufacturers which might be utilized by them in the production of munitions for exportation to the European belligerents.

Close study of the results of the recent canvass has convinced the officials, however, that if the strict letter of the Secretary's ruling is adhered to the Government will lose a large part of the benefit it might otherwise derive, and further that it is possible to differentiate between the encouragement of manufacturers making war material for foreign governments and such co-operation by the War Department as may be necessary to assist those who wish to fit themselves up to produce munitions of special United States army types.

MANUFACTURERS READY TO EQUIP FOR GOVERNMENT WORK

The department has received a number of attractive propositions from concerns which propose to equip themselves for the production of special articles of which the Government would stand in great need in the event of an emergency and to bear this expense themselves without any guarantee as to future contracts, provided the ordnance experts will furnish all the data necessary to provide the equipment and especially to operate it at minimum cost. It appears that certain well informed manufacturers are aware of the fact that the Government at the Watertown, Frankford and Rock Island arsenals is able to produce certain classes of material at prices which would offer no inducement to existing private establishments, and that, irrespective of such bookkeeping advantages as the Government enjoys in the elimination of interest on the investment, overhead, etc., this is due largely to experience gained in the production of work consisting chiefly of "repeat" operations to which certain forms of scientific shop management can be applied.

The officials of the department are convinced that the Government would consult its own interests if it frankly accepted the situation and not only provided responsible manufacturers with the data they desire in the shape of drawings, specifications, etc., but would permit them to visit the arsenals and study the methods by which the cost of producing many important items of war material has been reduced considerably below the lowest known figures of private establishments. Questions of responsibility, good faith and actual benefit to the Government would have to be carefully considered in this connection, but there appears to be no good reason why the problem could not easily be solved, except as it may involve the department's neutrality policy.

GOVERNMENT MAY YET CO-OPERATE

On this score there is something to be said to-day that perhaps could not have been said when the German and Austrian protests against the exportation of munitions were filed with the State Department. At that time all but a few manufacturing concerns were without experience in the production of war material and many were eagerly seeking information in any quarter where it might be found. Such data as the Government now has under consideration would have been of much value to many of these producers. To-day, however, the foreign governments which have placed contracts in the United States have a very large staff of experts in this country fully equipped with drawings, specifications, models, etc., and experienced inspectors are located in every important plant for the purpose not only of protecting the purchasing governments against the delivery of inferior products, but also to co-operate with the producers in devising the most efficient and expeditious processes. Under these circumstances the War Department has little or nothing that would be of use to manufacturers engaged on foreign work. It would seem that substantially all of the objections that might have been raised a few months ago to the propositions of American manufacturers now under consideration fall to the ground and that the Ordnance Bureau is free to go to any reasonable lengths in co-operation with those who wish to equip themselves at their own expense for the manufacture of material especially designed for the use of the United States army. This view of the case appears to be rapidly gaining ground among high administration officials and it would not be surprising should the department in the near future modify the ruling which now stands in the way of the Government's availing itself of patriotic offers of a number of thoroughly responsible manufacturers.

Secretary Garrison's detailed plan for improving the army and the coast defense system is understood to involve a greater expenditure on account of personnel than material; indeed, it is a significant fact, indicating the absurdly inadequate strength of the United States army, that although, as measured by modern European standards, we have but few guns and little ammunition, our present fighting force is incapable of manning the existing equipment. The plans of the Secretary of War regarding personnel involve such an increase, however, that many more guns and a very large quantity of ammunition would be required, and in addition it is proposed to build up reserves with a liberal hand although not to the European standard. Howitzers and field guns are likely to be chiefly in demand. Any increase in the present stock of big rifles for coast defense work will depend upon the attitude of Congress toward the recommendations of the fortifications board. W. L. C.

New Steel Plant Proposed at Baltimore

A project is under way for the construction of a plant in or near Baltimore, Md., for the electrical production of alloy steel billets by a company shortly to be incorporated. Henry Hess, former president Hess-Bright Mfg. Company, Philadelphia, Pa., manufacturer of ball bearings, is the promoter, and through the efforts of the Industrial Corporation of Baltimore local capitalists have subscribed for $250,000 of the stock. The total capital at the start is placed at $375,000, but it is expected that this will be increased to $1,000,000. The location of the plant has not yet been decided upon, but Canton, a suburb of Baltimore, is regarded favorably, as it possesses excellent shipping facilities by both rail and water. One of the reasons for the selection of Baltimore for the proposed plant is that the Consolidated Gas, Electric Light & Power Company underbid similar companies in other cities for furnishing the required electric current.

The Zenith Furnace Company, Duluth, Minn., will shortly place in operation two new hot-blast stoves, 20 ft. in diameter by 80 ft. high. The stoves were built by the Duluth Boiler Works at a cost of $70,000.

A Government Plant for Making Munitions

The High Cost of Operation and of Maintaining an Organization Make It Impractical—Steel Works Requirements

BY H. H. CAMPBELL

The cost of building vessels in our Government yards is greater than in private establishments, notwithstanding that our Government does not charge off anywhere near enough for depreciation. Of course, it is stated by interested politicians and by labor agitators and by Socialists that the work in these Government yards is of superior quality; but this is such an indefinite and unproved statement that it may be disregarded. This increased cost is not due to incompetency, but to the fact that the managers are not allowed to manage. It is the old story of mixing business and politics.

Not long ago, in some of our Government shops an attempt was made to improve methods of work and to find out, by using a stop watch, the actual time necessary for certain operations; but our wise Congress forbade this, probably because they associated a stop watch with a horse race. There was not one Congressman out of a dozen who knew what was meant by scientific management; the only thing the average member did know was that some labor agitators told him he would lose his job if he exercised any intelligence.

It is inevitable that work in Government factories will cost more than in private shops. There always will be more red tape and there always will be interference by politicians who wish to make places for their henchmen. There can be no piece work and no bonus system, while labor agitators can ply their trade without hindrance and can completely disorganize the shop. This lack of control of operations by a responsible executive head and the losses resulting from inefficient methods will be serious if the Government undertakes the manufacture of all munitions of war, as is urged by several groups of men.

THE ADVOCATES OF A GOVERNMENT FACTORY

The making of all munitions of war by the Government is urged by the pacificists, who claim that the makers of munitions stir up strife between the nations in order to increase their business. It may be true that this has been done in Europe, but it is rather hard to see how the Remington Arms Company or the Bethlehem Steel Company or the DuPont Powder Company, or all three together, could embroil the United States in a war. The danger from this source can hardly be accounted as much of an argument in favor of building big Government factories, and the remedy is out of proportion to the disease.

It is urged by labor agitators who know that Congress is an easy mark. Some years ago a department in Washington bought some printing machines to do some work that was being done by hand, just as it was done fifty years ago and more. The labor leaders objected, and although the President of the United States got down on his knees the machines stood idle because Congress was afraid of these demagogues. We can imagine about what would happen if improvements were made in labor-saving machinery in these munitions factories.

Government control of munitions manufacture is urged by the Socialists; but as they wish everything to be manufactured by the Government, their advocacy of the program can hardly be considered as of any weight.

It is also urged by a large number of people who do not realize what is involved in the proposition. We have to-day private companies engaged in making explosives of all kinds. Immense amounts, exceeding by far what the average would suppose, are used in quarries and in mines by contractors and in the clearing of farm lands, in cartridges for shotguns and sporting rifles, and not a little for Fourth of July celebrations.

In time of war this organization of skilled workmen and managers would be immediately available for national purposes. If the Government is to have powder factories big enough to supply its maximum requirements in time of war it must have immense works, for it is impossible to stock up indefinitely on account of the deterioration that takes place in the material. It would be out of the question to keep a full force of employees standing idle for 20 or for 100 years, waiting for the war that we hope never will come. But if it does come, with an immediate demand for an immense supply of powder, there would be no trained men and no organization fit for the task. We would have a great outlay for equipment which might never be used, and if war should come it would take quite a while before we would get a proper supply of powder.

THE PROBLEM OF MACHINES AND MEN

In order to make shells in quantities sufficient for active operations we would need perhaps a hundred acres of machine shops filled with lathes and drills, besides special machinery. This vast shop must be kept in order; it must be kept dry, and the machines must be oiled, while there must be a power plant and a lighting plant, with all the other accessories of such a factory. To supply our present army or navy with what is needed in time of peace we would not require one machine where a hundred or a thousand would be needed during a war. This great plant would stand idle, eating up money, while the machines might be entirely out of date by the time the war came.

We have again the problem of idle employees, for we could not keep 10,000 men sitting around the shop waiting for the war. The houses for the workmen would be empty, and still they must be kept all the time ready for occupancy. When the war did come it would be necessary to get together this immense force. Men would not come unless they were offered more than they were making wherever they were employed, because they would know that they would be thrown out of work at the end of the war. Many of them would have to leave their families, and for a long time the community would be more like a mining camp than a manufacturing town. Even grocery stores and butcher shops would have to be improvised, while at the end of the war there would be a complete break-up of the whole community. This does not commend itself to any one who has had to do with starting any new enterprise. But it is hardly to be expected that the man

in the street should appreciate what this all means, although a good idea of the situation may be had from some of the big plants that have been started in connection with the war orders.

STEEL WORKS AND EQUIPMENT PROBLEMS

Sometimes we must have, in addition to lathes and drills, a department of forging presses, and this increases the extent of the plant required, while the work is more difficult. Very few people know how big a plant would be required, because reliable figures are not published showing what the consumption of ammunition would be. John Hayes Hammond, Jr., has recently stated that we would need 300,000 shells a day, but from what we read in the papers it would seem as if all the machine shops in the world would not be able to supply the demand.

It must be considered that when the workmen are gathered together in time of war they will be taken from the factories throughout the country and this will completely disorganize our whole industrial system. We have to-day 10,000 machines scattered all over the country which can be used for the production of war material. This is a matter of general knowledge, for we know that plants which never contemplated the making of war material are to-day engaged in this work. Each one of these machines is tended by a workman, and the shop can, in a very short time and without much derangement, start on a war order. But if this workman is taken away hundreds of miles to a Government plant it will be some little time before everything is in full operation. Meanwhile the capacity for manufacturing this war material is idle, both in the Government and in the private plant. It is difficult to see where anybody gains by such a rearrangement, but it is not difficult to see where everybody loses.

In order to make these shells we usually start with rolled rounds, which are made on an ordinary bar mill. To carry out the argument of the men who advocate that the Government should make all the munitions of war the Government should own and operate such a bar mill. Then it should have a blooming mill and steel furnaces to make the raw material. If there should be a sudden demand for shells it would be almost impossible to get the requisite material under present conditions on account of the provisions about hours of labor in the steel works, which are insisted upon in Government specifications. No steel works will change its hours of labor just to suit a few more orders. Without any doubt the Government would have to give up its position on this point, just as the English labor unions have been compelled to give up their restrictions on output.

In making shrapnel we use ordinary steel, and the rounds are usual articles of commerce; but this can hardly be said of the raw material for high explosive shells. This steel must be made especially for the purpose, and the logic of the pacificists and of the advocates of Government production would inevitably lead to the building of a steel works. Nobody who knows anything of the steel business can look with any favor or with any patience on the proposition to build a plant big enough to produce the maximum requirements in war times, and have it standing idle in times of peace. The whole scheme is chimerical, and its advocates simply do not appreciate all that is involved.

The new plant of the Massillon Stamping & Enameling Company, Massillon, Ohio, is nearing completion and is expected to be placed in operation about Oct. 20.

Book Reviews

Poor's Manual of Industrials for 1915.—Pages 2872, 5¾ x 8¾ in. Published by Poor's Railroad Manual Company, New York. Price, $7.50.

This 1915 edition exceeds the 1914 issue in size by 412 pages of text, the increase being necessary by the addition of several hundred new statements presented for the first time in manual form. These statements cover companies in which public interest has lately appeared. The manual is compiled from official reports. It presents in detail the reorganization plans of the International Steam Pump Company and the International Mercantile Marine Company. In addition to giving statements on all industrials in which there is public interest, including those of all ordnance and copper stocks, there is an appendix giving late information on the railroads and public utilities. There are, for example, the details of the Missouri Pacific receivership, the $100,000,000 New York Central convertible debenture bond issue, the $40,000,000 4½ per cent notes of the Baltimore & Ohio Railroad, and the $115,000,000 Pennsylvania Railroad 4½s of 1960 and 1965.

This is the third book of the series for the current year, the others covering the steam railroads and the utilities. The three together contain 7198 pages, the largest number ever devoted to statements of American corporations.

The Modern Gasoline Automobile. By Victor W. Page, M.E. Published by the Norman W. Henly Publishing Company, New York. Price, $2.50.

This work of over 800 pages with 575 illustrations is a new edition of Mr. Page's book on construction, operation, maintenance and repair. With a few notable exceptions the changes in automobile construction through the past two years have been in the refinement of body lines and the improvement in mechanical details, and a fifty-four-page addition deals with the important innovations embodied in 1916 models of the best makes. These chapters cover the eight and twelve cylinder engines, new valve-operating systems, vacuum fuel feed, electric self-starting principles, one-unit and three-unit electrical systems, new body and spring designs, electric transmission, hydraulic brakes, etc.

With the advancing cost of gasoline, the discussion of possible substitutes will be of increasing interest to owners of pleasure cars, as well as to users of commercial vehicles. The work has been indexed to make it in fact a dictionary of the automobile. There are now said to be over 2,000,000 gasoline propelled vehicles in use in the United States. A careful perusal of Mr. Page's book by the drivers of these vehicles would make a long stride forward in efficiency and in the safety of travel on our highways.

The "Custom House Guide," which has just issued its thirty-third edition, is a publication of 320 pages, which is primarily intended for use by those who have business with the customs authorities of the port of New York. It gives the organization of the New York custom house, location of general order stores and warehouses and a directory of all departments. Other information given comprises tables of foreign currency, weights and measures adapted to customs purposes and much other matter of value to importers and exporters. The price is $1 per copy and the publisher is H. D. Chapman, 14 Reade Street, New York.

The Washburn Wire Company, Phillipsdale, R. I., contemplates the addition of a 20-ton open-hearth steel furnace. It will increase the capacity of the open-hearth department 50 per cent. The laboratory of the mill is being moved to provide room for an addition 80 ft. long.

The steam boiler code committee of the American Society of Mechanical Engineers held a meeting Sept. 27, disposed of some thirty cases of interpretation of rules and questions and arranged for a complete index to the code, which is shortly to get another printing.

Machinery Markets and News of the Works

HEAVY DEMAND CONTINUES

Attention Centered on Delivery Problem

Large Projects Continue to be Reported in Various Districts—Machine Tool Field Invaded with Some Bad Results

Every branch of the metal-working machinery trade is operating under full pressure. The one great problem is that of making deliveries, a proposition which is made more than ever a cause of worriment because of the unsettled labor conditions in the manufacturing centers. In New York the larger dealers are inclined to conduct sales more conservatively in view of the heavy commitments on their books. They regret that the demand for turning machines has brought into the field a few which are so poorly designed and constructed as to create a danger of bringing discredit on American tools in some quarters abroad, though they recognize that many of the machines made by novices in tool construction are well fitted to fulfill their mission, and are of satisfactory workmanship. A great deal of the new demand calls for large machines. From many items of interest in the various markets the following are selected:

It is reported from New England that the Colt's Patent Fire Arms Mfg. Company, Hartford, Conn., has received an order for rapid-fire guns, much larger than any recently placed, and that the company will shortly erect a factory to cost about $400,000. Building operations in Bridgeport, Conn., for the six months ended Oct. 1 represent an expenditure of over $6,000,000, an increase of 244 per cent over the entire year 1914. Local capitalists in that city have taken steps for the formation of a home-building company to house the additional employees in the city. The Lake Torpedo Board Company has taken out a permit for a large addition to its plant.

The Hammond Steel & Forging Company, Syracuse, N. Y., is doubling its capacity by the erection of a machine shop and several other buildings. The Brown Instrument Company, Philadelphia, has let a contract for an addition to its plant which will increase its manufacturing space by 50 per cent. The New Castle Construction Company, New Castle, Del., will erect a plant at New Castle for assembling the shells made by the General Electric Company and companies which have sub-contracts with the electric company.

The Cincinnati market notes a good demand in that city for sugar-making machinery, and some good orders from Spain for portable electric drilling machines. The Ohio State University, Columbus, is soon to purchase machine tools for its new shop building. The Cincinnati labor situation continues unsettled, though it is pleasing to note that the employees of Lodge & Shipley voted three to one against striking.

Cleveland manufacturers are figuring on new shell inquiries. In that city the inquiry for small lots of machine tools continues active, and there is no cessation of the larger inquiries, both domestic and foreign. The rubber industry at Akron, Ohio, is steadily expanding and additions to plants are under way or projected.

Milwaukee crane builders are busier than at any time within three years, and the demand for machine tools is on a par with that in other sections.

The machine-tool trade is quiet in San Francisco, but the inquiry for miscellaneous equipment, especially for mining use, is more active.

The Ogden, Logan & Idaho Railway is preparing to erect a shop at Ogden, Utah, to cost over $100,000.

New York

NEW YORK, Oct. 12, 1915.

The war demand for delivery at home and abroad continues active. There is a decided increase in the volume of inquiry for lathes because of the growing requirement of machines of larger sizes than have been called for heretofore. Buying for Russia and Italy has been good, and almost as good for France, the demand being largely for 30-in. to 40-in. engine lathes, although 24-in. machines are largely called for as well. Purchasing for England has subsided to a great extent because of the far-off and in some cases delayed deliveries, which have caused the English to put on more pressure in manufacturing machine tools at home.

Dealers in this city whose sales, on many of which deliveries are yet to be made, run into millions of dollars, are worried over the possible effects of the strikes in various machine-tool manufacturing centers. So far, they have managed to keep pace with their commitments, but they have the future to consider. The situation has caused them to be more careful in the matter of new business, some of which they are not at all eager to get. They are protecting themselves so far as they can against possible inability to make deliveries, and are closely scrutinizing all orders to avert future failures on the part of buyers to carry out the terms of contracts. A large percentage of cash with orders is frequently exacted. The making of fully secured sales is rendered more complex by the letting of sub-contracts, which, in some cases, are divided again. Of course, every aspect is satisfactory where some of the large banking institutions are guarantors.

It is regarded as unfortunate by the regular machine-tool trade that foreign buyers, in their zeal to get machines, have purchased certain tools placed on the market by concerns whose regular products are foreign to the machine tool trade. While it is true that some creditable machines have been made by various plants to meet the recent demand, some of the poorly designed and constructed tools which have been foisted on the market and sold to foreign purchasers cannot fail to bring the American trade into disfavor. This applies, of course, only to those foreign users who are not familiar with American products. Many of the machines were bought a few months ago at prices so low as to preclude their being good, while lately abnormally high prices have been quoted and obtained. Needless to say, reputable dealers do not handle the machines to which reference has been made.

The R. B. Phillips Mfg. Company, which has several plants engaged in the manufacture of munitions in New England, has bought approximately 600 machine tools in the past three weeks, and is inquiring for more. The company has shell orders amounting to several millions of dollars.

Some inquiry of a purely domestic character is that of the American Gas Accumulator Company, Philadelphia.

which is planning a new factory in or near Philadelphia. The Simms Magneto Company, Bloomfield, N. J., is busy on a contract with the Maxwell Motor Company, and is inquiring for additional machinery. Domestic buying, apart from that caused by the war, continues to pick up, and much more could be done if builders were in a better position to make deliveries.

It is reported that the Bethlehem Steel Company will soon come into the market for large machines needed in the manufacture of large shells.

Kraeuter & Co., Inc., 585 Eighteenth Avenue, Newark, N. J., manufacturer of drop forgings, cutlery and small tools, is in the market for 1000, 1200 and 1600-lb. board drop hammers, preferably of Billings & Spencer, Waterbury, or Chambersburg type. Specifications ask for the age, condition, price and complete particulars.

The Hammond Steel & Forging Company, Syracuse, N. Y., manufacturer of tool steels, forgings, alloy steels, etc., is erecting additional buildings to double the capacity of its works at Solvay, N. Y., including a main hammer shop, 60 x 180 ft.; boiler and machine shop, storehouse, annealing buildings, etc.

The Natural Products Refining Company, Jersey City, N. J., has purchased twenty lots at Holladay Street, Carteret Avenue and Canal Street. It has not started any construction work at the present time.

The William B. Burke Iron & Steel Company, Rochester, N. Y., has purchased a site at Scherer and Pomeroy streets for a one-story brick and steel factory, 140 x 200 ft.

The Heron Mfg. Company, Utica, N. Y., will build a two-story, 75 x 150 ft., addition to its plant on Linden Street. Robert Heron is president.

The Rotary Vending Machine Corporation, Esopus, N. Y., has been incorporated to manufacture vending machines, etc. The capital stock is $100,000. E. Adler, 6 West 107th Street, H. Cohen and P. L. Darrah, New York City, are the incorporators.

The Hasselbarth-Whiton Company, Utica, N. Y., manufacturer of iron and brass beds, springs, etc., has purchased additional land and will enlarge its plant to care for increasing business.

The Bossert Company, Utica, N. Y., has completed plans for an addition to be made this fall to its plant on Hickory Street.

The Nedrow Mfg. Company, Caledonia, N. Y., has filed articles of incorporation with a capitalization of $25,000 to manufacture furniture, screens, weather-strip, sash, door and wood and metal work. F. B. and J. S. Worden and Mrs. W. K. Walker are the incorporators.

The Rochester Rotary Washer Company, 55 Franklin Street, Rochester, N. Y., is having plans prepared for a three-story factory and office building to be erected this winter.

The Standard Shade Roller Corporation, Ogdensburg, N. Y., has been incorporated to manufacture window shade rollers, shades, cloth, etc. The capital stock is $25,000. C. R. Foss, W. D. Ingram and J. E. Kelly are the incorporators.

The Growers Cold Storage Company, Waterport, N. Y., will erect a cold-storage plant, 98 x 126 ft., three stories and basement.

The Superior Paper & Pulp Mfg. Company, Cohoes, N. Y., has filed articles of incorporation with a capital stock of $150,000 and will build a plant for the manufacture of pulp, paper, etc. The incorporators are H. L. Prankard and F. P. Kavanaugh, Waterford, and A. J. Burch, Troy, N. Y.

The Plastergon Wall Board Company, Tonawanda, N. Y., is taking bids for a factory, 60 x 273 ft., one story, and an office building, 40 x 40 ft., to be erected on Fillmore Avenue, and the New York Central and Erie Railroads.

The Buffalo Forge Company, Buffalo, has let contracts for the erection of an addition to its plant, 125 x 200 ft., one story, at Broadway and Tousey Street. Henry Wendt is secretary.

The Curtiss Aeroplane Company, Buffalo, has revised its plans for its latest plant addition at Austin Street and the New York Central Railroad and will erect a building, 125 x 400 ft., one story, of steel frame and brick, instead of 80 x 400 ft., three stories, as originally planned. The John W. Cowper Company, Fidelity Building, Buffalo, has general contract for construction and the Ferguson Steel & Iron Company the subcontract for structural steel.

The Diamond Match Company is building a power house, 40 x 80 ft., 72 ft. high, at its plant at Oswego, N. Y.

The F. A. Koch Mfg. Company has been incorporated by members of F. A. Koch & Co., Inc., 524 Broadway, New York City, manufacturer and importer of surgical instruments and cutlery, which is unable to get shipment of goods purchased in Germany. It will manufacture these goods, and has filed plans for the erection of a five-story brick factory, 72 x 130 ft., at 71 Flatbush Avenue, Brooklyn, N. Y., to cost about $80,000. F. A. Koch, C. Koch and E. Stratmann are the incorporators.

A. J. Beckley has recently purchased land adjoining the works of the Beckley Perforating Company, Garwood, N. J., having a frontage of several hundred feet along the Central Railroad of New Jersey, and will erect a steel frame and metal sash factory to be equipped with sheet metal-working machinery for the manufacture of sheet-metal products.

Catalogs Wanted

Henry Du Moulin, Brussels, is at present in this country making arrangements to represent American manufacturers in Belgium, France and Holland. He desires catalogs, price lists, etc., to be sent to him at 452 West 124th Street, New York City.

New England

BOSTON, MASS., Oct. 11, 1915.

The Scovill Mfg. Company, Waterbury, Conn., has been given a permit for an addition, 50 x 60 ft., one story.

It is reported that plans have been drawn for the Colt's Patent Fire Arms Mfg. Company, Hartford, Conn., for a projected factory building to cost about $400,000. It is understood that the company has received an order for rapid-fire guns much larger than any previous one and word to erect the new building may be issued in the near future.

The S.K.F. Ball Bearing Company, Hartford, Conn., has completed the purchase of a tract of land, with a frontage of 500 ft., on New Park Avenue and adjoining the tracks of the New York, New Haven & Hartford Railroad, on which it will build at once.

Building operations in Bridgeport, Conn., for the six months ending Oct. 1 represent construction worth $6,099,616, an increase of 244 per cent over the total for the entire year of 1914. The demand for houses is such that local and outside capitalists at a meeting held Oct. 5 appointed a committee to consider the feasibility of organizing a company with capital of $2,000,000 or $3,000,000 to build workmen's homes.

The Sulloway Mills, Franklin, N. H., are to build at once a two-story addition, 76 x 154 ft.

It is believed that the visit of Charles M. Schwab to the plant of the Bath Iron Works, Bath, Me., the past week portends the taking over of the Bath Iron Works by the Bethlehem Steel Corporation, its former owner. The Bath plant was formerly active in building destroyers and battleships.

The National India Rubber Company, Bristol, R. I., is running some departments until 10 p. m. as a result of the brisk demand for insulated wire.

Potter & Collamore, Warren, R. I., have built a wharf, 160 ft. long, to facilitate its work upon boats.

The Allinmesh Transmission Company, Springfield, Mass., has been incorporated with capital of $250,000 to manufacture and deal in tools, machines and automobiles. The directors are Ralph M. Wight, president; John H. Madden, treasurer, and J. H. Malley.

The Hinkley Mfg. Company, Boston, Mass., has been incorporated with capital of $75,000 to manufacture locknuts, etc. The directors are Joseph H. Boyd, president; Martin S. Hinkley, treasurer, and W. H. Griffith.

The directors of the port of Boston, acting for the Commonwealth of Massachusetts, have sold to John B. Finley, president of the Colonial Steel Company, 12,500 ft. of land at D and Fargo streets, South Boston, Mass. The National Fireproofing Company will erect a building to be occupied by the Colonial Steel Company.

The R & S Machine Company, Boston, Mass., has been incorporated with capital of $50,000. Walter S. Railstock is president and treasurer.

The Spencer Wire Company, Worcester, Mass., is building a one-story structure, 46 x 125 ft., with monitor roof, to be used for manufacturing purposes. It is also making an addition, 42 x 46 ft., one story, to one of its older buildings.

The L. W. Pond Machine & Foundry Company, Worcester, Mass., is erecting an addition to be used for office purposes.

The Reed-Prentice Company, Worcester, Mass., has awarded a contract for a storage building, 41 x 80 ft., one story, and a separator house, 14 x 16, one story.

The Sterling Blow Pipe Company, Suffield, Conn., is making additions and improvements to its plant.

The Lake Torpedo Boat Company, Bridgeport, Conn., has taken out a permit for a building, 90 x 240 ft., with an ell, 60 x 60 ft.

The Holtzer-Cabot Electric Company has recently moved into its new plant on Armory Street, Roxbury, Mass. It con-

sists of a main building, 60 x 300 ft., six stories, with annex, 50 x 100 ft., six stories; boilerhouse 42 ft. square, and foundry 60 ft. square, one story. The plant has siding connections with the New York, New Haven & Hartford Railroad, and is built entirely of reinforced concrete.

Philadelphia

PHILADELPHIA, PA., Oct. 11, 1915.

Fire Oct. 11 is reported to have done considerable damage to the third floor of the machinery and pattern-making plant of Paxon & O'Neil, 541 North Third Street, Philadelphia, Pa., manufacturers of knitting machinery. All the machinery and stock on the third floor were destroyed.

The Edward G. Budd Mfg. Company, Twenty-fifth Street and Hunting Park Avenue, Philadelphia, Pa., worker of sheet metals, has awarded contract to the Belmont Iron Works, Twenty-second Street and Washington Avenue, for the construction of a one-story steel frame die storage building, 15 x 160 ft., to cost about $3,500. The construction was made necessary by the great amount of work which the company has in its automobile and railroad work.

The Baum Leather Company, 145 Columbia Street, Philadelphia, has awarded contract to Edward T. Bender, 6014 Torresdale Avenue, for the construction of a one-story addition, 36 x 40 ft., to cost about $1,000.

Finnesey & Kobler, manufacturers of wagons, etc., have awarded contract to Herman Voigt, Twenty-eighth and Parrish streets, for the construction of a two-story brick addition, 36 x 180 ft., to be erected at Twenty-sixth Street south of Parrish Street, at an estimated cost of $11,500.

Ream Foundry Company, manufacturer of sash weights, etc., Lebanon, Pa., will add to its cupola capacity and storage department.

The Earle Gear & Machine Company, Stenton & Wyoming Avenues, Wayne Junction, Philadelphia, is erecting a one-story and basement office building 51 x 65 ft., of brick and stone.

The Girard Iron Works, Twenty-second and Master streets, Philadelphia, Pa., is building a new plant at Twenty-second Street and Alleghany Avenue, which it will occupy about Dec. 1. It has started the construction of an addition to the plant, 30 x 38 ft., one story of frame and iron to cost about $800.

The Brown Instrument Company, Wayne and Windrim streets, Philadelphia, has let contract for an addition to its plant which will give it about 50 per cent additional floor space. The increase has been made necessary by a strong demand for its high-temperature pyrometers. R. P. Brown is president.

Edward M. Harris has awarded contract to Edward Cunningham, 50 North Twenty-third Street, Philadelphia, for the construction of a one-story brick garage on Fairmount Avenue east of Fifteenth Street, 92 x 106 ft. to cost about $8,000.

Contract has been awarded by the Armstrong estate to Edward Rensswick, 137 North Nineteenth Street, Philadelphia, for the construction of a one-story concrete and brick garage at 975 North Ninth Street, 100 x 120 ft., to cost about $5,000.

It is reported that the American Ammunition Company has completed a fuse factory at Paulsboro, N. J., and will start operations shortly.

The Lancaster Iron Works, Lancaster, Pa., is building an addition to its plant at Seymour and Hager streets, of steel construction, 122 x 230 ft., to be equipped with 40-ft. and 50-ft. box electric traveling cranes. W. W. Posey is president and general manager.

The Dallastown Furniture Company, Dallastown, Pa., plans to construct an addition, 100 x 120 ft., two stories, of brick construction, which will double its capacity. A. F. Fix is president.

Baltimore

BALTIMORE, MD., Oct. 11, 1915.

Plans have been prepared by the Maryland Steel Company, Sparrows Point, Md., for a foundry, 100 x 625 ft., one story, of brick construction.

Buildings at the munition testing and shipping station of the Poole Engineering & Machine Company, Woodberry, Md., which is to be established near Texas, Md., will include three buildings, 20 x 60 ft. each, three 12 x 12 ft., one 40 x 40 ft., an office building 45 x 30 ft. and a loading platform 30 x 200 ft.

The powerhouse work and the contract for heating the twelve buildings of the Bartlett-Hayward Company at Turner Station, Md., where war munitions will be made, have been awarded to the Enterprise Steam & Hot Water Heating Company, 407 North Howard Street, Baltimore.

A coal tipple, which will cost about $150,000, is being installed in the Huntingdon yards of the Baltimore & Ohio Railroad, Baltimore.

The Arthur McMullin Company, New York City, has been awarded the contract for the construction of a coal pier at Canton, Md., 66 x 935 ft., to cost $1,000,000, for the Pennsylvania Railroad. The Mead-Morrison Mfg. Company, Boston, Mass., will install the machinery.

A two-story addition will be built to the plant of the Alma Mfg. Company, manufacturer of buttons, 611 South Monroe Street, Baltimore.

An addition, which will include a machine shop, will be constructed by the Ideal Garage, Frederick, Md.

The Chestertown Electric Light & Power Company, Chestertown, Md., plans to spend about $5,000 on additional machinery.

That the plant to be constructed on the Delaware River near New Castle is for the Remington Arms Company, is a persistent rumor.

Williamsburg, Va., has voted $30,000 for the construction of a waterworks.

The Samuel Austin & Sons Company, Cleveland, Ohio, has been awarded contract for the construction of a plant at New Castle, Del., which will consist of three buildings of brick and steel, 100 x 400 ft., 40 x 200 ft. and 30 x 150 ft., and an office building. It is being erected for the New Castle Construction Company, New Castle, Del., in which the General Electric Company, is interested, and will be used for assembling shells. The estimated cost is about $40,000.

Milwaukee

MILWAUKEE, WIS., Oct. 11, 1915.

The local machine-tool situation has come to the point where manufacturers are obliged to decline orders unless delivery is specified a long time ahead. The demand for lathes cannot be filled. Crane builders are busier than they have been in more than three years, but are taking specifications regularly. The extraordinary demand for machinists' tools of all kinds as reported by local dealers indicates the unusually extensive employment of skilled labor. Representatives of tool houses say they have not booked so much business in years. Calipers are in the greatest demand. The ample stocks carried at factories and branches have saved the situation, however, and no shortage exists. Employers are somewhat worried over the attempts of professional strike agitators to induce machinists to demand higher pay and shorter hours, but believe that ample wage increases given voluntarily from time to time since the rush came upon them will have the effect of preventing serious labor troubles.

The Pawling & Harnischfeger Company, Milwaukee, crane builder, has booked several additional orders for Eastern delivery and is working to capacity. Repeat orders have been received from the Bethlehem Steel Company and the William Cramp & Sons Ship & Engine Building Company, while several new buyers have appeared, including the Milford Foundry Company, Milford, Mass., and the American Car & Foundry Company, Berwick, Pa. Better demand for cranes is evident in the Middle West, but inquiries are not maturing so readily as those from the Eastern States.

The Hartman Machine Company, Milwaukee, is about to erect a shop, one and two stories, 60 x 120 ft., including two boilers, at Meinecke Avenue and Twenty-ninth Street, according to plans by Herbst & Hufschmidt, architects, 721 Caswell Block.

The Pulley Grip Company, Milwaukee, has been incorporated with a capital stock of $25,000 to manufacture chemical preparations for industrial purposes. The incorporators are R. Bryant Henning, E. A. Boettcher and H. H. Piltz. Offices have been established at 1005-06 Pabst Building, Milwaukee. It will specialize in a glue for application to pulleys to minimize slipping of belts and improve traction.

Pulaski, Wis., voted to construct a municipal waterworks system. Plans will be prepared by W. G. Kirchoffer, consulting engineer, Madison, Wis.

J. Hamacheck & Sons, machinists, Two Rivers, Wis., have started work on the erection of a garage and machine shop of steel and hollow tile, 50 x 120 ft.

The R. C. Wells Mfg. Company, Fond du Lac, Wis., which recently passed into the control of Richard H. Mansfield, formerly of the Cutler-Hammer Mfg. Company, Milwaukee, has started a large production of an automatic fuel economizing device for chimneys and stacks. The order is from a Chicago house and calls for 20,000 devices monthly. The company is also working on large orders for electric starting and lighting systems and switches for automobiles.

Kentzler Brothers, liverymen, 107 East Doty Street, Milwaukee, are remodeling their stables into a garage and repair shop, to be two and three stories, 66 x 184 ft.

Arthur Peabody, university architect, Madison, Wis., is completing plans for the new physics building and laboratory for the University of Wisconsin, to cost $180,000. No date has been set for taking bids.

Articles of incorporation have been filed by the National Zinc Separating Company, Platteville, Wis. The capital stock is $50,000 and the incorporators are W. N. Smith, A. W. Kopp and L. A. Brunckhorst.

The Kenosha Knitting Company, Kenosha, Wis., has succeeded in getting delivery on a large order for Duobied automatic power knitting machines from Switzerland, which were contracted for since the outbreak of the war.

The Struebing-Roberts Motor Company has been organized at Sheboygan, Wis., to conduct a garage and machine shop on North Ninth Street. The principal owners are Herman Struebing and Edward Roberts.

Herbst & Hufschmidt, architects, 721 Caswell Block, Milwaukee, are preparing plans for a plant for the Milwaukee Auto Engine & Supply Company, 708 Winnebago Street. J. B. McCabe is secretary.

J. A. Brady and W. N. Littlewood, Madison, Wis., have purchased the garage and machine shop of F. J. Statz, 323-325 West Johnson Street, Madison, and will enlarge the business. Mr. Brady is a general manager.

The Molle Typewriter Company, Kewaunee, Wis., has practically concluded a deal with the merchants and manufacturers' association of Oshkosh, Wis., for the location of the proposed plant in Oshkosh on a bonus basis. Plans for a factory will not mature for some time. John E. Molle is general manager.

A permit has been issued to the Milwaukee Die Casting Company, Manufacturers Home Building, Milwaukee, to build a foundry and machine shop, 50 x 60 ft., costing $12,000, at 297 Fourth Street, Milwaukee.

Fred Schubring, Wausau, Wis., is preparing to build a machine shop, garage and wagon shop at First and Scott streets. It will be of brick and steel, two stories, ell-shaped, 38 x 67 and 54 x 77 ft.

The Waukesha Motor Company, Waukesha, Wis., advises that plant additions now under way include a power and heating plant building, 44 x 66 ft., an assembly room and finished stock room, 88 x 220 ft., which will afford a much increased space for machine shop work in present buildings, and a new testing room and heat treating department. The buildings are to be of structural steel and brick construction, with saw tooth roofs.

The Sheboygan Novelty Company, Sheboygan, Wis., will erect an addition to its plant, four stories, 20 x 95 ft., for which equipment will be purchased.

Plans are being prepared for an additional building to the Hamilton Beach Mfg. Company's factory at Racine, Wis., to cost about $100,000.

Chicago

CHICAGO, ILL., Oct. 11, 1915.

The machinery trade is viewing with no small concern the labor difficulties which at Cincinnati alone have temporarily tied up the operations of nine machine-tool building plants. Not only is there the foreboding of protracted future deliveries still further delayed, but the filling of orders now overdue in shipment is jeopardized. To the turmoil of an unprecedented rush of business with a large excess of unsatisfied inquiry, further confusion is added. Inquiry is insatiable and apparently showing no indications of lessening volume. The amount of business still being done in the West in filling orders for shipment to the East and Canada is now augmented by a largely increased demand from manufacturers close at hand. Extensions of shop buildings and equipment are noted in every direction, and the variety of manufactures for which larger capacity appears to be necessary is surprising. An interesting speculation attaches to the aftermath of the present situation with reference to the second-hand machinery market. The supply of used machinery in a number of lines is now well-nigh exhausted. What will the market do with the large number of machines which will one day have outlived their period of particular usefulness now at its height? In one day a Chicago machinery dealer sold sixty-eight used machines of various types to a miscellaneous number of buyers, most of whom would have been glad to have new tools. They will do only temporary service in their present location. The railroads, which, generally speaking, are buyers of new tools only, are purchasing little or nothing, and two lists which have long been in the market are still unclosed.

The Austin Mfg. Company, Harvey, Ill., will build an addition to its machine shops, 100 x 300 ft., of brick and steel construction, to cost approximately $30,000.

The Ingalls-Shepard Company, Harvey, Ill., has let contract to T. D. Hobson for a two-story concrete forge shop, 100 x 100 ft., to cost $30,000, and for a one-story brick boilerroom, 35 x 35 ft., to cost $5,000.

The Superior Mfg. Company, Preston, Iowa, has been reorganized with M. F. Block as president, to manufacture road-building machinery. It will have a capital stock of $10,000.

The La Plant Furnace Company, Marshalltown, Iowa, has broken ground for a foundry building, but does not expect to have it completed before spring.

The Wichita Casket Company, Wichita, Kan., will erect a large plant.

The Aultman Taylor Machinery Company, 393 South Wichita Street, Wichita, Kan., has made arrangements to occupy a recently erected two-story machine shop, 115 x 123 ft.

Fire completely destroyed the new icehouse of the Cudahy Packing Company, Omaha, Neb., entailing a loss of $100,000.

August Hohenstein, St. Paul, Minn., is in the market for a 20-in., belt-driven, double back-geared engine lathe.

The Northwestern Textile Company, Duluth, Minn., is considering the necessity of enlarging its plant, installing new machinery, etc. James E. Dingwall is manager.

The Western Coke Company will construct a large coke and gas plant at St. Paul, Minn., to cost about $2,000,000.

Cleveland

CLEVELAND, OHIO, Oct. 12, 1915.

Cleveland manufacturers figuring on contracts for machining shells have inquiries out for about 200 lathes, mostly 18 and 20-in. sizes, not being able to take orders for the work until they can arrange for the required machinery. A portion of the equipment can be secured in new types of single purpose machines. The demand for turret lathes has slackened, but an inquiry is out for fifty machines for Russia. The general demand for small lots of machine tools continues active and machinery houses could increase their business were they able to make deliveries desired. General conditions in manufacturing lines have improved and plants not affected by war business are busy with orders. Automobile plants making forgings and other parts are running to capacity.

The Johns Machine & Stamping Works Company, Cleveland, recently incorporated with a capital stock of $100,000 by Benjamin F. Johns, and others, will establish a plant at Columbus Road and Leonard Street for the manufacture of juvenile vehicles. It will be equipped with stamping and sheet metal-working machines.

The Parrish & Bingham Company, Cleveland, makers of automobile frames and sheet-metal stampings, has purchased a 10-acre site adjoining its new building and will erect an additional factory.

The Brenbunfers Engineering Company, Lorain, Ohio, recently organized to manufacture ammunition, is reported to have received a large order for machining high explosive shells for Russia. It has purchased a plant in Lorain, formerly occupied by the Cleveland Ice Machine Company. Charles A. Otis and several other Cleveland men are interested. Thomas N. Brennan, president of the Brennan Steel Castings Company of Cleveland, is president and Silas Easton of Otis & Co., is treasurer.

The Toledo Machine & Tool Company, Toledo, Ohio, will erect a two-story building, 75 x 112 ft., to be used for a pattern room and pattern shop.

The Zahner Metal Sash & Door Company, Canton, Ohio, has completed a two-story addition, 60 x 120 ft., which is being placed in operation.

Large extensions will be made to the rubber tire industry in Akron, Ohio. The Goodrich Rubber Company has begun the erection of a five-story building 270 x 800 ft., and will also erect a six-story building. The Goodyear Tire & Rubber Company will build an eight-story building 80 x 100 ft. The General Rubber Mfg. Company, Akron, Ohio., has been incorporated with a capital stock of $200,000 by M. O'Neil, and others, to manufacture rubber tires and accessories.

The Bay View Foundry Company, Sandusky, Ohio, will erect a one-story building 60 x 125 ft. and make other changes and extensions. The enlarged factory space will double the capacity of the plant.

The Porter Rubber Company, Salem, Ohio, recently organized to establish a plant for the manufacture of rubber tires, will erect a building 66 x 312 ft. The machinery has been contracted for.

The Ohio State University, Columbus, Ohio, will erect a machine shop to cost about $135,000. C. M. Steeb is secretary and J. W. Bradford architect of the university.

Indianapolis

INDIANAPOLIS, IND., Oct. 11, 1915.

Van Buren, Ind., will receive bids Oct. 21 for pumping equipment. Charles Brossman, Merchants Bank Building, Indianapolis, is the engineer.

The Rathbun Novelty Company, Indianapolis, has been incorporated with $10,000 capital stock to manufacture novelties. The directors are F. A. Rathbun, H. Daniel and H. L. Porter.

The Rutenber Motor Company, Marion, Ind., has contracted for the building of a third story to its plant, which will give the company 30,000 ft. more floor space and will increase its capacity 40 per cent.

The Laporte Radiator Company, Laporte, Ind., has dissolved.

The Colfax Drain Tile Company, Colfax, Ind., has been incorporated with $25,000 capital stock to manufacture clay products. The directors are Henry K. Lee, J. M. Waugh and Jerry B. Casey.

The Sheron Brothers Drain Tile factory, West Marion, Ind., which burned recently, will be rebuilt and its capacity increased 50 per cent.

The Laporte, Ind., plant of the M. Rumely Company is working on 10,000 sets of castings, which will keep a large force of men employed from two to three months. It is said the castings are for auto trucks to be used in the European war.

The General Insulating & Mfg. Company, Alexandria, Ind., has increased its capital from $100,000 to $250,000.

The Calumet Cast Stone Company has been incorporated at East Chicago, Ind., with $10,000 capital stock to manufacture and sell mineral fiber building board and other concrete products. The directors are W. C. Barrett, H. E. Shephard and W. F. Anderson.

The Hill Pump Company, Anderson, Ind., has been incorporated with $250,000 capital stock to manufacture pumps. The directors are Hugh Hill, G. B. Ayers and E. M. Wilson.

The Holland Machine Company, South Bend, Ind., has been incorporated with $152,500 capital stock to manufacture machinery. The directors are W. H. Holland, Cyrus Workinger and George Snyder.

The Anderson Foundry & Machine Company, Anderson, Ind., will erect two additions to its factory.

The Pierce Speed Controller Company, Anderson, Ind., will erect a factory to cost $5,000.

The Inter-State Motor Company, Muncie, Ind., has started the construction of an addition to its factory, of brick and steel, containing 36,000 sq. ft. of floor space. It will be three stories, 80 x 150 ft. R. W. Twyman is general manager.

Detroit

DETROIT, MICH., Oct. 11, 1915.

The American Screw Products Company, Detroit, has been incorporated with a capital stock of $15,000, to manufacture a line of metal goods. The incorporators are Benjamin Babcock, Augustus I. Galorneau and Arthur F. Brand.

The Studebaker Corporation, Detroit, has taken steps to provide for the extension of its No. 3 plant at Clark Avenue and Fort Street by the purchase of the plant of the Peoples Ice Company, adjacent thereto.

The Wilmarth & Morman Company, Grand Rapids, Mich., is enlarging its plant by the erection of an assembling building that will double its present capacity.

The Plank Flexible Shaft Machine Company, Grand Rapids, Mich., has moved into larger quarters at 710-712 Monroe Street, which provides 5000 sq. ft. of floor space. It has acquired a building site upon which it plans to eventually erect a four-story concrete factory.

The Oliver Machinery Company, Grand Rapids, Mich., has added to its present line of products, the manufacture of 16-in. engine lathes.

The Vanguard Mfg. Company, Detroit, manufacturer of automobile accessories, has awarded the contract for an addition to its plant.

The Standard-Detroit Tractor Company, Detroit, has been incorporated with a capital stock of $100,000 to manufacture gasoline tractors and other farm machinery. The incorporators are M. L. Pulcher, Detroit, and Edward P. Hammond and Frank G. Jacobs, Pontiac, Mich.

The Industrial Foundry Company, St. Johns, Mich., has purchased the plant and equipment of the St. Johns Foundry Company, and will rehabilitate it.

The business of the Brady-Nagel Mfg. Company, Detroit, has been purchased by S. W. Sorensen and J. B. Allen, who will continue the manufacture of automobile specialties under the style of the S-A Machine Company. The company's plant is at 518-520 Woodbridge Street, East.

The Blood Brothers Machine Company, Allegan, Mich., has been reorganized with L. H. Mattingly as vice-president and general manager. The company will eliminate several of its present lines and specialize in the manufacture of universal joints.

The Wallace Brothers Furniture Company, Grand Rapids, Mich., is enlarging its plant by the erection of two additions, 35 x 75 ft., and 50 x 125 ft., each two stories.

The American Bell & Foundry Company, Northville, Mich., has increased its capital stock from $32,000 to $50,000.

Wixom & Bensiger, Ovid, Mich., are erecting a factory for the manufacture of handles and wooden wagon parts.

The Central Michigan Clay Products Company, Williamston, Mich., recently organized with $100,000 capital stock, is planning on the erection of a factory this fall.

The Weis Fibre Container Company, Monroe, Mich., has broken ground for the erection of a manufacturing building, 90 x 220 ft.

The Lansing Mower Company, Lansing, Mich., has been incorporated with $60,000 capital stock to manufacture power lawn mowers. It has secured a factory. Bert J. Baker, George R. Holmes and Holly M. Verplank are the incorporators.

The Dongon Electric Mfg. Company, Detroit, is constructing an addition, 30 x 50 ft., to its plant.

The West Michigan Steel Foundry Company, Muskegon, Mich., is building an addition to its foundry, one part of steel and another portion, 42 x 50 ft., of mill construction. It has already made arrangements for the necessary equipment. W. E. Jeannot is president.

The Frost Gear & Forge Company, Jackson, Mich., will add 5200 sq. ft. of floor space to its gear department to allow for rearranging its machinery and provide space for the installation of Gleason gear generators, turret lathes, drill presses, external and internal grinding machines, gear hobbing machines and milling machines, nearly all now purchased. The present plant has 23,000 sq. ft. of floor space in the gear department and 20,000 sq. ft. in the forge department. Contracts for automobile parts necessitates the increase.

Three Rivers, Mich., will receive bids until 1 p. m. Oct. 21 for waterworks and lighting plant, including two water wheels and generators, motor-driven centrifugal service pump, centrifugal fire pump, etc. E. A. Schall is city clerk.

Cincinnati

CINCINNATI, OHIO, Oct. 11, 1915.

The labor situation in sections of the Central West is still in an unsettled state. Up to Saturday 14 firms in Cincinnati had received and rejected demands by workmen for a 48-hr. week and tacit recognition of the union. An encouraging feature is the refusal of the employees of the Lodge & Shipley Machine Tool Company to go out on a strike. The shop vote was three to one against taking the step proposed by the labor leaders. It is generally known that machinists in and around Cincinnati are now receiving the highest wages in the history of the business in this section of the country, so it seems somewhat incredible that any of the men are willing to jeopardize their positions by making extreme demands on their employers. So far, none of the Cincinnati foundries has been affected, and it is stated that no demands are anticipated at present. In Hamilton four foundries are having labor troubles, although they have not ceased operations. In the same city a demand was made on one of the large machine shops, and in a shop vote taken Thursday of last week the majority against inaugurating a strike was over five to one. The following day, however, most of the workmen laid down their tools, and the matter has not yet been settled.

A good demand for sugar-making machinery is noted, mostly from Spanish-America. Some nice orders for portable electric drilling machines have been received from Spain. The boiler and tank business is improving.

The T. T. Haydock Carriage Company, Cincinnati, contemplates manufacturing automobiles. If tentative plans are carried out a good number of machine tools and other equipment will be required.

It is reported that the Western Water Motor Company, Oxford, Ohio, intends to move its plant to Cincinnati. Definite details are not available.

The Concrete Flooring Company of Kentucky, Norwood,

Ohio, has been incorporated with $50,000 capital stock and will erect a plant at Baker Street and Sherman Avenue. It is understood to be a branch of the Concrete Flooring Company of Ohio, whose headquarters are in Cleveland.

The Huss Furniture Mfg. Company, Hamilton, Ohio, has been incorporated with $100,000 capital stock by Charles W. Huss, Cincinnati, and others. It will take over the business of the Huss Brothers Mfg. Company, Cincinnati, and will also fit up a factory at Hamilton, Ohio.

The Standard Register Company, Dayton, Ohio, has received a number of orders for autographic registers, and is adding to its equipment.

The Lindker Brothers' Sanitary Milk Company, Dayton, Ohio, has increased its capital stock from $40,000 to $50,000 for the purpose of enlarging its refrigerating plant.

The Columbia Planter Company, Springfield, Ohio, has increased its capital stock from $100,000 to $125,000 in order to take care of its increasing business. Equipment details are lacking.

The Joseph Schonthal Iron Company, Columbus, Ohio, scrap iron and second-hand rail merchant, intends to add some yard equipment.

The Shields Pattern Works, Columbus, Ohio, has moved to more commodious quarters at 57 North Fourth Street.

The Ideal Light Car Company, Columbus, Ohio, has been incorporated with $100,000 capital stock to manufacture a light automobile. C. O. Howard is one of the incorporators.

Machine shop equipment will soon be bought by the Ohio State University, Columbus, Ohio, for installing in a new addition. J. W. Bradford, Columbus, drew up the plans for the new building.

The John A. Oberhelmann Foundry Company, Cincinnati, has plans prepared for a fireproofed foundry building to be erected at Spring Grove Avenue and Arlington Street. The proposed structure will be 120 by 240 ft., of reinforced concrete steel and brick construction. Work will be commenced on the plant at an early date.

The Mead Pulp & Paper Company, Chillicothe, Ohio, is making an addition to its plant that will be used mostly for warehouse purposes.

The Edwards Mfg. Company, Fitch and Eggleston streets, Cincinnati, Ohio, manufacturer of corrugated arches, etc., is in the market for a forming machine, carrying about five pairs of rolls for rolling small channels and other 6-in. shapes, from No. 12 strip steel. Specifications call for a bid and particulars of machines submitted.

The Central South

LOUISVILLE, KY., Oct. 11, 1915.

Increasing inquiries indicate further improvement in machinery lines. Sales continue somewhat above the level of recent weeks, though extensive orders are scarce. Various projects taking form in this section promise a good volume of business shortly. Machine tools are in demand, and general business conditions are looked upon optimistically.

The Gooch Hunt Auto & Machine Company is preparing to occupy a new garage at Market Street and Central Avenue, Somerset, Ky., to be fitted out for blacksmith, plumbing, heating, sheet metal, garage and repair operations.

The L. D. Fastiger Company, Afton, Tenn., is to purchase generators, etc., to develop electricity from a dam which it will build on the Chucky River at a cost of $100,000.

The Halls Cotton Gin, Halls, Tenn., was recently destroyed by fire. Improved machinery had been installed this season and will have to be replaced.

Machinery losses suffered when the plant of the S. R. Dungerford Lumber Company, Memphis, Tenn., burned, will be repaired. Total damages reached $50,000.

It is expected that J. M. Phelps will replace the machinery recently damaged in the fire which destroyed his stave mill at Marks, Miss. The plant was one of the largest in the State and was recently purchased from the Dinwiddie Stave Company, Louisville, Ky.

Plans and specifications for the filtration plant of the United Gas & Electric Company, New Albany, Ind., have been prepared. The improvement will cost $80,000.

The Automatic Package Scales Company, incorporated in Louisville, Ky., will establish a factory to manufacture scales for use in feed and grocery sales. Detailed plans for the factory equipment have not been completed. The company has $10,000 capital and the incorporators are Charles A. Edinger, William E. Edinger and Oscar W. Edinger, of Edinger & Sons, Fourteenth and Magazine Streets, Louisville, and R. J. Zanone.

The Cloverport Boat & Mfg. Co., which has incorporated and taken over the Cloverport Boat & Machine Company, Cloverport, Ky., will continue operating the old foundry and equip a general machine shop for boat repair work.

St. Louis

ST. LOUIS, MO., Oct. 11, 1915.

The machine-tool stocks of St. Louis dealers are so thoroughly depleted that it is seriously handicapping business. The demand for both new and second-hand tools is good and the difficulty in meeting it is accentuated from week to week. War orders going through tool manufacturers' plants take precedence over the general industrial demand. New enterprise investments are increasing and tool requirements with them, while replacements and extension demand is also broad. No large lists are appearing; but single tool request is much increased.

The Lowell Bleachery, Lowell, Mass., which acquired a site in St. Louis some years ago and which has since been conducting very exhaustive tests of water and other requirements for its needs, has decided to proceed at once with the construction and equipment of a large plant on its property at Polk and Stein streets, which is being cleared for construction work.

The St. Louis Portable House & Garage Company, St. Louis, Mo., has been incorporated with a capital stock of $15,000 by Frank A. Mohr, George F. Haid and James C. Jones, Jr.

The Geila Mfg. Company, St. Louis, Mo., has been incorporated with a capital stock of $42,500 by R. G. Dienstbier, J. B. Black and H. J. Harms and will equip to manufacture metal equipment and surgical instruments.

The McQuay-Norris Mfg. Company, St. Louis, Mo., has increased its capital stock from $100,000 to $200,000 for the purpose of increasing its factory capacity for the manufacture of piston rings.

The Bismarck Electric Light & Power Company, Bismarck, Mo., has been incorporated with a capital stock of $12,000 by G. A. and F. F. Wahl and C. F. Starck and will equip a public service plant.

The St. Joseph Paper Box Company, St. Joseph, Mo., has been incorporated with a capital stock of $25,000 by L. C. Hamilton, Charles E. Wright and B. W. Lisenby.

Slater, Mo., is receiving bids for one 250-kw., 60-cycle, three-phase, 2300-volt alternating current generator with exciter directly connected to a 300-hp. engine, bidders' specifications and guarantees. J. A. Stern is city clerk.

A sawmill for the manufacture of black walnut wood products with a daily capacity 100,000 ft. will be equipped at Joplin, Mo., by the Pickrel Lumber Company, St. Louis. Hans Glaeser will be manager.

A factory to cost with equipment about $300,000 will be erected at Kansas City, Mo., by the American Can Company, 447 West Fourteenth Street, New York City.

The Adams Automobile & Supply Company, Chillicothe, Mo., has increased its capital by $25,000 and will enlarge its repair and machine shop.

An electric light plant of undetermined capacity is to be installed at Gurdon, Ark., by F. E. Wright.

The Earle Light, Water & Ice Company, Earle, Ark., has been incorporated with a capital stock of $15,000 by Louis Barton, W. B. Rhodes and I. E. Freeman and will equip a public service plant.

New engines are to be installed in the electric light and power and waterworks plants at Gravette, Ark. The mayor should be addressed.

The waterworks commissioners of Malvern, Ark., after drilling a number of new wells will increase the pumping capacity of the waterworks.

A plant for the manufacture of slack barrel hoops will be equipped at Jonesboro, Ark., by J. F. Speice, Pocahontas, Ark.

The light and heating plant recently burned at the Langston, Okla., Negro Agricultural and Mechanical College will be replaced and the officers of the institution are now in the market for equipment.

Muskogee, Okla., has voted a bond issue of $350,000 for a gas pipe line with pumping equipment to supply gas to manufacturing establishments in that city. The city commissioners are in charge.

The New Idea Oil Gas Burner Company, Oklahoma City, Okla., has been incorporated with a capital stock of $20,000 by C. H. Fleet, W. S. Nelson and R. S. Nelson and will equip to manufacture a patented device.

The stave plant of J. M. Phelps, Marks, Miss., has been burned. The machinery will be replaced.

The National Coop & Box Company, Lake Charles, La., is in the market for heading and short log sawing equipment, nailing machines, riveters, electric drills and boring machinery.

A waterworks plant to cost about $47,000 will be built by the city of Gretna, La., under the supervision of Frank T. Payne, city engineer.

The sawmill of the Napoleonville Cypress Company, Napoleonville, La., has been burned with a loss of $25,000.

The power plant and about half of the mill equipment of the Peavy-Byrns Lumber Company, Kinder, La., have been destroyed by fire.

The Stearns Acid Company's plant, Elysian Fields and Florida Avenue, New Orleans, La., has been burned with a loss of $80,000.

The machinery of the W. K. Henderson Iron & Supply Company, Shreveport, La., has been damaged about $50,000 by fire.

The sawmill and kilns of the Sabine Lumber Company, Zwolle, La., have been burned with a loss of $100,000.

Texas

AUSTIN, TEX., Oct. 8, 1915.

The machinery and tool trade is very satisfactory. The high price of cotton has stimulated all lines of industry and trade. The demand for irrigation pumping machinery has increased, particularly in the so-called shallow water belt of western Texas.

The coach repair shop, paint shop and storeroom of the Texas & Pacific Railroad at Marshall which was recently destroyed by fire, entailing a loss of $700,000, will be rebuilt.

The Van Horn Valley Land & Railway Company, Van Horn, Tex., and Minneapolis, Minn., will put down a large number of shallow wells and install an irrigation pumping plant upon each well for the purpose of developing a tract of about 200,000 acres of land.

The Texas Power & Light Company, Dallas, has purchased a site of fifty acres of land on the Red River north of Denison, Texas, upon which it will build a large electric power plant.

H. V. Fowler, Dublin, will install a pumping plant for furnishing the town with water.

Birmingham

BIRMINGHAM, ALA., Oct. 11, 1915.

Wholesale dealers report business as picking up in all directions. Steam engines and boilers are in excellent demand. Wood-working machinery is probably the best seller, and iron-working machinery is also going well. The volume of business has increased considerably, and general conditions are reported as good.

The Continental Gin Company, Birmingham, is putting in an addition to cost $10,000.

The Stewart-Witherill Machine Company, Birmingham, has been incorporated with a capital stock of $20,000 and will continue a plant now in operation. Charles C. Stewart is president.

The Evans County Cotton Oil Mill Company, Hagan, Ga., has been incorporated with a capital stock of $10,000 by W. H. Hodges and others.

Ackworth, Ga., has voted bonds for establishing a water works and electric lighting system.

The board of port commissioners, Jacksonville, Fla., have let contract to the Hillyer & Sperring Company to erect a cotton compress and warehouse. The press is to have daily capacity of 1500 bales.

The electric plant, West Palm Beach, Fla., will be enlarged by the Ariston Ice & Electric Company.

The Florida East Coast Railway will establish car shops at Miami. E. W. Kirtland, St. Augustine, is assistant to the vice-president.

It is stated that about $400,000 will be expended in improving the plant of the Electric Light & Power Company, McComb City, Miss., by a New York corporation, which has purchased the plant. S. M. Jones, president of the Commercial Bank & Trust Company, Laurel, Miss., is the authority.

The Gulf, Florida & Alabama Railroad is preparing to begin the construction of a large coal pier at Pensacola. The Louisville & Nashville Railroad will also construct a coal dock.

The W. N. Henderson Iron Works & Supply Company, Shreveport, La., will rebuild the portion of its plant recently damaged by fire with a loss of $40,000 to $50,000.

San Francisco

SAN FRANCISCO, CAL., Oct. 5, 1915.

The machine-tool situation is especially quiet. Very few tools are coming through, and most of them are sold prior to arrival, offerings being even smaller than the limited demand. Stocks of both new and desirable second-hand tools are closely cleaned up. Occasional Eastern and foreign orders drift this way, but nothing can be done with them. It is difficult to get any kind of a promise in regard to deliveries.

A slight activity in many lines is resulting in more numerous inquiries for boilers, engines, motors, transmission equipment, and to some extent for specialized factory outfits, but the revival has made no great headway. The trade was largely supported up to about two years ago by railway and hydroelectric development and other large construction projects, and the financial support needed for a general resumption in these lines is not yet available. Mining development, however, is fairly active; orders for compressors, hoists, oil and gas engines, etc., for such work are numerous and increasing. Some of the implement factories have been unable to close for the usual fall overhauling. The Union Iron Works is busy. The Pacific Foundry, this city, has been working on a large contract for furnace castings for the Tacoma Smelter, Tacoma, Wash.

According to a report from Long Beach, Cal., a new company has been organized to take over the Craig shipbuilding plant of that place and make extensive improvements, conditional upon the securing of submarine contracts.

Construction has been started on a large addition to the Atlas Powder Company's works at Giant, Cal.

It is announced that the Ogden, Logan & Idaho Railway is preparing to make a number of improvements, including new car barns and shops at Ogden, Utah, at a cost of over $100,000.

Edwards & Stowe have started an oxy-acetylene welding plant at Globe, Ariz.

The California Power & Mfg. Company is starting work on a hydroelectric plant at Fall River Mills, Cal. It is planned to use the current for irrigation in the surrounding country.

The Midway Gasoline Company is building a large gas condensing plant near Taft, Cal.

Contracts for compressors, drills, etc., for use on the Hetch-Hetchy municipal water project have been divided between the Ingersoll-Rand Company, Rix Compressed Air & Drill Company, and Chicago Pneumatic Tool Company.

Plans are complete for a sewer pumping plant for the city of Honolulu, T. H.

The Marchant Calculating Machine Company, Oakland, Cal., states that the first unit of its new factory will be completed within 60 days and the machine-tool equipment required will include milling machines, lathes and drill presses.

The Culver Mfg. Company, Culver City, Cal., has been organized to manufacture a miniature automobile for children. Harry H. Culver is president; George W. Somerville, vice-president; C. H. Warner, of the Stewart-Warner Speedometer Corporation, treasurer, and C. E. McHugh, secretary. W. A. Faris is also on the board of directors.

The Beardsley Electric Company, Culver City, Cal., closed a contract for the erection of a plant, 64 x 200 ft., including a blacksmith shop, tinning department, paint and enameling shops, woodworking, testing, stock and assembling departments.

The Pacific Northwest

SEATTLE, WASH., Oct. 5, 1915.

General business conditions are improving. A number of orders pending this past summer have materialized, and the fall trade bids fair to be brisk. Municipal improvements aggregating hundreds of thousands of dollars are now under way. Collections are improving slightly.

The Lake Mercantile Company, Great Falls, Mont., will erect a machine shop, 50 x 60 ft., in connection with its present machine shop.

A brass foundry is being constructed by John Rohrberg, Camas, Wash. It will have a capacity of 2200 lb. Machinery is being installed, and the plant will be in operation within thirty days.

The Port Commission, Seattle, of which J. W. West is engineer, has completed plans for the refrigeration equipment for its seven-story, 150 x 200-ft. ice and cold storage plant at the East Waterway terminals. Bids for the machinery, which will cost $100,000, will be received soon.

The roundhouse and shops of the Chicago, Milwaukee & St. Paul Railway Company, in Malden, Wash., were damaged by fire recently. Eight engines were damaged in the fire.

The Seattle-Astoria Iron Works, Seattle, will build a small addition to its plant, also a shed for sand, and garage. Bids will be taken shortly. Improvement will cost approximately $5,000.

Approximately $20,000 is being expended by the Coast Culvert & Flume Company in improvements to its plant at Kenton Station, Portland, Ore. Improvements include a new heavy mill building, and the installation of machinery for manufacturing smooth pressure pipe for irrigation, power and drainage purposes. A large traveling crane is also to be erected.

An unconfirmed rumor states that Canadian interests plan the purchase of several of the largest Seattle steel plants for the manufacture of war munitions. It is stated that Hughes, McMicken, Dovell & Ramsey, local attorneys, and Samuel P. Watson of the Assets Financing Company, Seattle, hold options on the plants.

The Sunset Explosive Products Company, Seattle, has been incorporated for $150,000 by Benjamin R. Jones and Arthur S. Jones.

The Perfection School Desk Mfg. Company, Spokane, Wash., has increased its capital stock to $200,000. It is understood new funds will be used in making improvements and additions to the plant.

Canada

TORONTO, Oct. 11, 1915.

W. H. Banfield & Sons, Pape Avenue, Toronto, will build an addition to their shell plant.

A new addition will be built to the plant of the Swift Canadian Company, Keele Street, West Toronto.

The Alberta Hydro-Electric Power Company will build a power plant at Calgary, Alberta. Ald. Fawkes is consulting engineer.

A pumping station to cost $35,000 will be built at St. Andrews, N. S.

The Mattagami Pulp & Paper Company will commence at once on the erection of pulp and paper mills at Smooth Rock Falls on the Mattagami River, near Jacksonboro, Ont., to cost $2,000,000.

Preparations are being made to reopen the plant of the Canadian Steel Foundries, Ltd., Welland, Ont.

A. Davis & Son, Ltd., Kingston, Ont., is in the market for one 125 to 150-hp. Wheelock engine; one 100-kw., 550-volts, 60-cycle, three-phase alternating current generator and one 100-kw. direct-connected, 550-volts, 60-cycle, three-phase, alternating current generator set.

The Dominion Brake Shoe & Foundry Company, Ltd., St. Thomas, Ont., has been incorporated with a capital stock of $200,000 by James S. Lovell, in care of Blake, Lash, Anglin & Cassels, 25 King Street, West, Toronto, William Bain, Ernest H. Stewart and others to manufacture brake shoes, iron and steel castings, forgings, etc. It will build a foundry at St. Thomas.

The Canadian Duplex Steam Trap Company, Ltd., Walkerville, Ont., has been incorporated with a capital stock of $40,000 by Joseph H. Mailhot and Thomas G. Rakestraw, Detroit, Mich.; Harry O. Kerr and Stephen A. Griggs of Walkerville, Ont., and others to manufacture steam traps, iron, steel, brass and other metal tanks, valves, etc.

The Chevrolet Motor Company of Canada, Ltd., Toronto, has been incorporated with a capital stock of $500,000 by Harry Horsman, 135 Crescent Road; George E. Wooldridge, care of Dominion Carriage Company, George E. McCann and others to manufacture motors, engines, automobiles, etc. It is building a plant at Toronto.

The United Jewelers, Ltd., Toronto, has been incorporated with a capital stock of $25,000 by Alexander H. Beath, Sudbury, Ont.; Richard L. McGill, Galt, Ont.; John G. McLean, Stratford, Ont., and others to manufacture watches, cutlery, clocks, etc.

The Montreal Engine Packing Company, Ltd., Montreal, Que., has been incorporated with a capital stock of $20,000 by Edgar A. Wright and Gordon B. Kingan of Westmount, Que.; Hugh MacKay and Edson G. Place and others to manufacture machinery, asbestos, etc.

The Standard Toys, Ltd., Toronto, has been incorporated with a capital stock of $40,000 by John A. Chantler, 8 Wellington Street, East, Toronto, Ernest W. Chantler and others to manufacture metal toys, light hardware, etc.

The Canada Malleable & Steel Range Mfg. Co., Ltd., Oshawa, Ont., has increased its capital stock from $250,000 to $350,000.

The Scott-Chamberlain, Ltd., Galt, Ont., has been incorporated with a capital stock of $250,000 by Frank S. Scott, William Chamberlain, William Lund and others to manufacture leather goods, etc.

The Norfolk & Rochester Hardware Company, Ltd., Haileybury, Ont., has been incorporated with a capital stock of $40,000 by James M. Hall, Joseph J. McLean and others to manufacture hardware, machinery, etc.

Saunders, Lorie & Co., Ltd., 196 Adelaide Street, West, Toronto, has been incorporated with a capital stock of $200,000 by Solomon Lorie, William J. Beaton and others to manufacture jewelry, clocks, watches, silverware, etc.

The Great West Direct Power Engine Company, Ltd., Vancouver, B. C., has been incorporated with a capital stock of $25,000 to manufacture engines, machinery, etc.

A. B. Cahoon, Cedar Rapids, Mich., is contemplating building a furniture factory at Vancouver, B. C.

The Port Moody Steel Works, Ltd., Port Moody, B. C., is contemplating the erection of a plant to cost upwards of $100,000.

The Ideal Electrical Mfg. Company, Wallaceburg, Ont., manufacturer of electrical heating goods, will shortly move its plant to Chatham, Ont.

It has been urged by a delegation of members of Parliament that the shops of the Sorel Shipyards, Sorel, Que., install new machinery and manufacture shells, as well as using a privately owned factory there for that purpose.

The Kelsey Wheel Company, Ltd., Walkerville, Ont., has increased its capital stock from $150,000 to $250,000 and will build an addition to its plant.

The British Columbia Copper Company, with headquarters at Green Wood, B. C., will expend approximately $1,000,000 in betterments at its properties in Western Canada. Plans include a power plant, either at Princeton or Coalmont, to be constructed at a cost of $300,000. An aerial tram from the camp to Princeton, a distance of nine miles, is under consideration. Oscar Lachmund is general manager.

Government Purchases

WASHINGTON, D. C., Oct. 11, 1915.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, Until Oct. 26, schedule 8860, for one 36-in. x 22-ft. engine lathe; schedule 8859, three 125-hp. induction motors; until Nov. 2, schedule 8878, one electric welding outfit, all for Washington; until Nov. 9, schedule 8875, for one oxygen compressor for Mare Island.

Bids were received by the Bureau of Supplies and Accounts, Navy Department, Washington, Oct. 5, for supplies for the navy yards, as follows;

Schedule 8780, Ordnance

Class 41, Washington—One 12-ft. boring and turning mill—Bid 113, $11,198, $11,300, $11,120, $11,290, $11,330, $11,200, $10,110 and $9,850; 165, $9,747.

Class 42, Washington—Two geared-head lathes, with attachments—Bid 113, $2,848.80; 150, $5,041.80; 165, $2,924.

Class 43, Washington—One geared-head lathe, with attachments—Bid 113, $1,165.90; 150, $1,040; 165, $1,230.50.

Class 44, Washington—One belt-driven trimming press—Bid 7, $1,240; 79, $910; 157, $1,260; 205, $910; 219, $819.

Schedule 8781, Steam Engineering

Class 51, Boston—One turntable lathe—Bid 110, $1,525 and $1,825; 170, $2,460 and $2,010; 175, $2,555; 245, $2,650.

Schedule 8782, Steam Engineering

Class 52, Boston and Philadelphia—Two engine lathes—Bid 113, $1,429.65 and $875.60.

Class 53, Boston and Philadelphia—Two crank shapers—Bid 113, $991.80 and $876.40; 150, $980; 157, $915, $880 and $869; 165, $1,105; 170, $1,216.

Class 54, Boston and Philadelphia—Two upright drills—Bid 113, $563; 150, $492.

Class 55, Boston and Philadelphia—Two double emery grinders—Bid 34, $175.50; 37, $162.50; 113, $217.50; 150, $175.50; 157, $175.50 and $179; 158, $130.

The names of the bidders and the numbers under which they are designated in the above list, are as follows:

Bid 7, E. W. Bliss Company; 34, James Clarke, Jr., Electric Company; 37, The Cincinnati Electric Tool Company; 79, Ferracute Machine Company; 110, Jones & Lamson Machine Company; 113, Kemp Machinery Company; 150, Manning, Maxwell & Moore, Inc.; 157, D. Nast Machinery Company; 158, Neil & Smith Electric Tool Company; 165, Niles-Bement-Pond Company; 170, Prentiss Tool & Supply Company; 175, Pratt & Whitney Company; 200, A. B. Sands & Son Company; 205, D. H. Stoll Company; 219, Swind Machinery Company; 245, Warner & Swasey Company.

NEW TRADE PUBLICATIONS

Thermit Welding.—Goldschmidt Thermit Company, 90 West Street, New York City. Pamphlet No. 17. Describes and illustrates the use of the Thermit process in steel plants, rolling mills and foundries for repairing broken parts. After a brief description of what Thermit is, the apparatus employed is described and directions for using it given together with general instructions for the welding of wrought iron and steel sections. The illustrations throughout the pamphlet for the most part are of actual operations.

Internal Combustion Engines.—Bolinders Company, 30 Church Street, New York. Bulletin No. 19-15. Relates to a line of stationary engines using heavy crude oil as fuel. A brief description of the engine, which is of the two-cycle, hot-bulb type, is given, the text being supplemented by a section through the engine and an engraving of the luubricating system. A number of small engravings of the various styles that can be supplied are included.

Steam Shovels.—American Steel Dredge Company, Fort Wayne, Ind., Bulletin No. 10. Concerned with a single-line type of revolving shovel which takes its name from the fact that it employs a single-cable hoist controlled by a multiple-geared engine instead of a multiple-cable hoist controlled by single-geared engines. The advantages claimed for this arrangement are that the dipper can be hoisted to a greater height and there is more space in the cab. The construction of the shovel is gone into at some length and the text is supplemented by a number of engravings of the shovels at work. A drawing of the shovel with the various dimensions lettered to correspond with the specification table is included.

Automatic Machine Tool Control.—Electric Controller & Mfg. Company, Cleveland, Ohio. Calendar. Relates to an automatic motor control for machine tools. An engraving of a lathe equipped with this type of control occupies the upper portion of the hanger while the calendar pad, which measures 10¾ x 17 in., occupies the remainder. The calendar begins with Oct. 1 and each sheet contains the days for the previous, present and following months. The figures used for the present month are of good size and of the outline type while those for the other two months are small block figures.

Presses.—Standard Machinery Company, Auburn, R. I. Catalog. Illustrations and descriptive matter explain the construction and operation of a line of power presses of the arch, open-back, blanking and trimming, double joint, double crank reducing, inclinable, cut and carry and cam types. The catalog is divided into sections, one being devoted to each particular style of press. In each section after a brief general description of the line of presses, illustrations of the different units are presented and the section is completed by a table of dimensions. Mention is also made of the accessories such as roll and dial feeds, countershafts and revolution counters. A line of foot and screw presses and drop hammers is also shown.

Turret Lathes and Automatic Dies.—Jones & Lamson Machine Company, Springfield, Vt. Collection of loose-leaf circulars and two booklets. The circulars refer to various sizes and styles of automatic and flat turret lathes. The make-up of these circulars is practically identical, a view of some particular lathe being presented with a brief description and table of specifications below. One of the booklets is the company's Flat Turret Lathe Manual which is intended to aid the flat turret lathe operators in acquiring a true understanding of the machine. It is really more than a catalog, the first 65 pages being devoted to such subjects as the Opportunities Afforded in the Machinery World, the Personal Side of the Workmen, Dignity of Work, etc. After this the various features of the flat turret lathes are taken up and this is followed by illustrations and brief descriptions of the different parts of the lathe and the operations that can be performed on it and a number of plans for the erection of these lathes. The other booklet gives general descriptions and specifications for an automatic die. It is profusely illustrated and in addition to describing and illustrating the various dies, instructions for using them are presented and a number of tables of useful information are included.

Boiler Feed Pumps and Steam Turbines.—Alberger Pump & Condenser Company, New York City. Bulletin No. 21. Describes and illustrates a line of centrifugal boiler feed pumps and the steam turbines employed for driving them. The design and construction of the pumps and turbines are gone into at some length and their advantages for the service they are called upon to perform are touched upon. In addition to the illustrations of the various pumps and turbines, views of the different parts and the several combinations of machines that can be supplied are included, together with a number of dimension tables and diagrams and views of installations.

Air Compressor Valves and Pneumatic Drills.—Chicago Pneumatic Tool Company, Fisher Building, Chicago, Ill. Booklet No. 213 and bulletin No. 216. The first describes the Simplate flat disk valve for air compressors. The special feature of these valves is the use of plates which are independent of one another in action and have individual springs. At a low speed only one plate acts, while when full speed is attained all three plates are operative. The construction of these valves is gone into at some length, the text being supplemented by a number of line drawings. The bulletin covers the Hummer self-rotating type of hammer drills which are made in three sizes for drilling holes ranging from 6 to 12 ft. in depth. The special features of this drill are elimination of the ratchet and pawl parts for rotating the steel, which in this case is entirely independent of the hammer system, and the use of a ball valve. The construction of the drills is gone into at some length and the text is supplemented by a number of halftone and line engravings and diagrams of the drills numbered to correspond with repair part lists are included. Mention is made of the various kinds and sizes of drill steel that are intended to be used.

Centrifugal Pumps.—A. S. Cameron Steam Pump Works, 11 Broadway, New York City. Bulletin No. 134. Deals with a line of vertical centrifugal pumps which are made in the single and double suction types and also for sump use. Illustrations and sectional drawings of the various pumps are incorporated in the bulletin and specification and dimension tables are included.

Shell Heating Furnaces.—Tate, Jones & Co., Empire Building, Pittsburgh, Pa. Folder entitled "Shells and Shell Furnaces." Gives detailed information on the heating equipment required for forging, annealing, nosing, heat-treating, banding and baking of shells and the annealing of cartridges and cases for shrapnel and high-explosive shells. The specifications covering the steel used for shells and shrapnel of all kinds and other information regarding this class of work are included.

Scrap Metal Baling Press.—Tempus Reclaiming & Mfg. Company, Philadelphia, Pa. Circular. Treats of a metal press for compressing into bundles or bales tangled wire, light sheet metal, etc. The construction of the press, which was illustrated in THE IRON AGE, May 13, 1915, is briefly touched upon and data on the size of the machine, character of the product, etc., are included.

Electrical Apparatus.—Wagner Electric Mfg. Company, St. Louis, Mo. Bulletins Nos. 109, 110, 111 and 112. Contain illustrations and brief descriptions of the construction, operation and use of a line of electrical apparatus which includes single-phase converters, single and polyphase motors and generators and synchronous motors. In addition to the engravings of the various parts of the several machines, views of them in use and reproductions of characteristic curves are included.

Twist Drills, Reamers and Cutters.—Union Twist Drill Company, Athol, Mass. Catalog G. Size 4¾ x 7¾ in.; pages, 381. Deals with a line of twist drills, reamers, gear and milling cutters, machine tools, etc. The catalog is divided into sections, one for each particular class of tools, an index leaf of contrasting color being inserted at beginning of the divisions to set them out clearly. The table of contents of each section with references to the pages on which the various sizes and styles of tools are illustrated and described are given on these colored inserts. For the most part a separate page is devoted to each particular type of tool with an illustration and a table of the sizes that can be furnished. The machine tools illustrated include grinding, cold saw cutting-off and spur gear testing machines. A number of bles of useful information and diagrams of comparative sizes of gear teeth are included.

Largest Rivets Ever Used

The longest and heaviest steel rivets ever employed on a bridge are being put in the new Hell Gate bridge of the New York Connecting Railroad, it is stated by Gustav Lindenthal. The largest are 1¼ in. in diameter and pass through steel plates which combined are 9 in. thick. On the present Quebec bridge the heaviest are 1⅛ in. in diameter. On the day before the fatal collapse of its predecessor, the heads of rivets began popping off like pistol shots.